OBSERVATION ON THE CURRENT BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY OF CHRONIC SUPPURATIVE OTITIS MEDIA

THIS DISSERTATION IS SUBMITTED TO SANTOSH UNIVERSITY IN PARTIAL FULFILMENT OF THE UNIVERSITY REGULATIONS FOR THE AWARD OF THE DEGREE OF

MASTER OF SURGERY

(OTORHINOLARYNGOLOGY AND HEAD & NECK SURGERY)

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ACKNOWLEDGEMENT

I bow with reverence, all humility and gratitude to thank The Almighty for giving me the opportunity to undertake this work and the ability to successfully complete it.

I feel great honour to express my deep sense of gratitude and obligation to my most revered teacher, illustrious guide and genius mentor **Dr. TARUN MALHOTRA**, Professor & Head, Department of Otorhinolaryngology, Santosh Medical College & Hospital, Ghaziabad without whose able guidance and keen interest, the aim of my study could not have been accomplished. The treasure of knowledge as well as ethics and moral values gained from my esteemed teacher will remain my most valuable assets throughout my life. His masterly advice, sustained encouragement, generous help and invaluable guidance helped me a lot, throughout the course of the study. It has been a matter of great pride and privilege for me to work under the able guidance of my teacher. For his perseverant supervision, unending support and fatherly affection, I owe him a lifelong gratitude.

I would like to give vote of thanks to **Dr. SUSHIL GAUR**, Professor, Department of Otorhinolaryngology Santosh Medical College & Hospital, Ghaziabad for his valuable guidance and ever optimistic encouragement. It has been my proud privilege to work under him. His unabated inspiration, keen critical acumen, valuable suggestions, encouragement, and timely guidance were vital to this study.

I would like to offer special thanks to my co- guide **Dr. RITU JAIN**, Assistant Professor, Department of Microbiology, Santosh Medical College & Hospital, Ghaziabad, for her esteemed guidance & support throughout my research.

I feel great honour to express my deep sense of gratitude and obligation to my most revered teacher, **Dr. ABHAY KUMAR SINGH**, Associate Professor, Department of ENT for his perseverance supervision, unending support.

I would like to thank my parents. **DR. HARSHAD SHAH & MRS. KAMALINI SHAH** for believing in me & constantly encouraging as well as supporting me to become better in every phase of life.

A special thanks to **Dr. AARAV** and **Dr. SUKRITI** for their friendship, guidance, patience and gentle support without which this project would not have seen light of the day.

Thanks to Dr. Raina, Dr. Abhinav, Dr. Shruti and all my seniors and juniors who guided & encouraged me during my course and were a great source of inspiration and mental support. They were there for me through thick and thin.

I am grateful to my colleagues Dr. Ravi, Dr. Samridhi and Dr. Mansi for always having each other's back when it mattered the most.

I bow my head in sincerely acknowledging to all my patients who kindly consented to become the subjects of this thesis. Without their cooperation this study would not have seen the light of the day.

DR. DIRGH SHAH

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INTRODUCTION

Infections of middle ear cleft and their complications have affected humans from the beginning. Described by Hippocrates in 450 BC, this process continues to present one of the most commonly experienced medical problems in infancy and childhood**.** It is one of the leading causes of decreased hearing in young children [1].

The worldwide prevalence of Chronic Suppurative Otitis Media (CSOM) is 65 to 330 million people and out of them 60% of people having clinically significant hearing impairment. [2]

Chronic suppurative otitis media (CSOM) is defined as a as chronic inflammation of mucoperiosteal lining of middle ear and mastoid cavity, presenting with recurrent ear discharge through a tympanic membrane perforation.[3] Disease usually starts in infancy as spontaneous tympanic membrane perforation following an acute infection of the upper respiratory tract leading to infection of middle ear cavity spreading through the Eustachian tube. Generally, patients with eardrum perforations having continuous mucoid, mucopurulent, purulent discharge for the period more than 6 weeks, are categorized as chronic suppurative otitis media cases.[4] The episodes of otorrhea often follow upper respiratory infections, water entry into the ear during swimming or bathing leading to intermittent ear discharge. Risk factors implicated are recurrent sore throat, low socio-economic status, age, poor hygiene, immunocompromised status, environmental factors, nutritional factors and facial anomalies etc.[5]

In CSOM bacteria implicated may be aerobic and anaerobic Gram-positive organisms included are Pseudomonas aeruginosa, Staphylococcus aureus, Haemophilus influenza; Gram negative organisms included are E. coli, Proteus mirabilis or anaerobic- Bacteroides', Pepto streptococcus. Bacteria are infrequently found in skin of external auditory canal, but may proliferate in the presence of trauma, laceration or high humidity. These bacteria gain entry to the middle ear through tympanic membrane perforation.

It is broadly classified as:

1. SQUAMOSAL DISEASE /UNSAFE TYPE/ ATTICOANTRAL TYPE

2. MUCOSAL DISEASE /SAFE TYPE/ TUBOTYMPANIC TYPE

Chronic suppurative otitis media can produce mild to moderate conductive hearing loss in many cases. This results from damage to eardrum and ossicular structure or from hair cell damage by bacterial infection or toxins that have entered the inner ear. Due to its persistent nature, there is irreversible local damage to middle ear cavity. Its recurrence may damage ossicles, facial nerve and cochlea leading to a permanent hearing loss.

The management includes medical & surgical treatment. Medical management includes aural toilet, oral and topical antibiotics. Due to inadequate medical treatment, chronic suppurative otitis media complications can occur. The frequency of life-threatening complications has dramatically reduced by more than 10 folds with introduction of antimicrobials.

CSOM is a multiple aetiology disease, well known for its recurrence in spite of treatment. The refractoriness of the disease to medication and its chronicity, leads to serious complications in several cases. [6]

ln setups where microbiological cultures are available, it can be used to aid in identifying the microorganism causing chronic suppurative otitis media and its appropriate antibiotic susceptibility.

Chronic suppurative otitis media has gained attention due to emerging bacterial resistance to both topical and systemic antibiotics. The indiscriminate use of antibiotics and poor follow up has resulted in persistence of low-grade infections. Change in microbiological flora owing to the introduction of sophisticated synthetic antibiotics has increased the relevance of reappraisal of modern day for in chronic suppurative otitis media lending greater importance to their in-vitro antibiotic sensitivity pattern for the clinician to chalk out the strategy for treatment. [7]

Therefore, the culture and sensitivity testing of micro-organisms and their antibiotic sensitivity helps in managing otitis media and its complications for prevention of emergence of resistant bacterial strains.

AIM & OBJECTIVES

- **AIM :**

  CURRENT BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY OF CHRONIC SUPPURATIVE OTITIS MEDIA.

- **OBJECTIVES :**

1. TO EVALUATE AND EXAMINE THE PATIENTS OF CHRONIC SUPPURATIVE OTITIS MEDIA ATTENDING ENT OUTPATIENT DEPARTMENT.
2. ISOLATE AND IDENTIFY BACTERIA CAUSING CHRONIC SUPPURATIVE OTITIS MEDIA IN PATIENTS.
3. TO DETERMINATE CURRENT ANTIBIOTIC SUSCEPTIBILITY PATTERN OF ISOLATED MICRO-ORGANISMS.

REVIEW OF LITERATURE

Otorrhea and cholesteatoma was seen since 2600 B.C.[8] The Greek philosopher Hippocrates (450BC) described this condition as a sequalae to brain abscess.[9]

Later Morgagni labelled it as a suppurative lesion.[10] Pre-historic Iranian population had features of middle ear disease.[11]

In 1867 Adam Politzer proposed "ex vacuo" theory for otitis media. According to him dysfunction of eustachian tube produces negative middle ear pressure leading to fluid collection in middle ear spaces.[12]

In 1914 Breiger suggested a second etiologic theory in which he said underlying inflammation produces otitis media. Armstrong in 1954 suggested use of tubes for ventilation and drainage of middle ear.

In 1958, Senturia and colleagues suggested microbiological analysis of ear discharge.[13] Chronic otitis media is a chronic condition of the middle ear cleft, in which a tympanic membrane perforation and discharge (otorrhea) are present.[14]

Chronic otitis media presents is a disease of childhood life but can continue till adulthood; It has been estimated that yearly 31 million new cases of chronic suppurative otitis media are seen with 22.6% in children less than 5 year old.[15]

EMBRYOLOGY OF THE EAR[16]

- **Pinna**: Develops from six ectodermal tubercles.
- **External auditory canal**:
  a. Cartilaginous part: From ectodermal placode of dorsal end of first branchial cleft.
  b. Bony part: From tympanic ring.
- **Tympanic membrane:**
  a. Outer squamous layer develops from ectoderm
  b. Middle fibrous layer develops from mesoderm
  c. Inner endodermal layer develops from tubo-tympanic recess

- Middle ear cleft and Eustachian tube; develops from tubo-tympanic recess and four primary sacs.
- Ossicles: Malleus and Incus; develop from 2nd arch mainly and otic capsule partly.
- Inner ear: Membranous labyrinth develops from otocyst which is ectodermal in origin. Bony labyrinth develops from mesoderm around otocyst.

ANATOMY OF EAR [17]

Ear is anatomically divided into three parts

- External ear
- Middle ear
- Inner ear

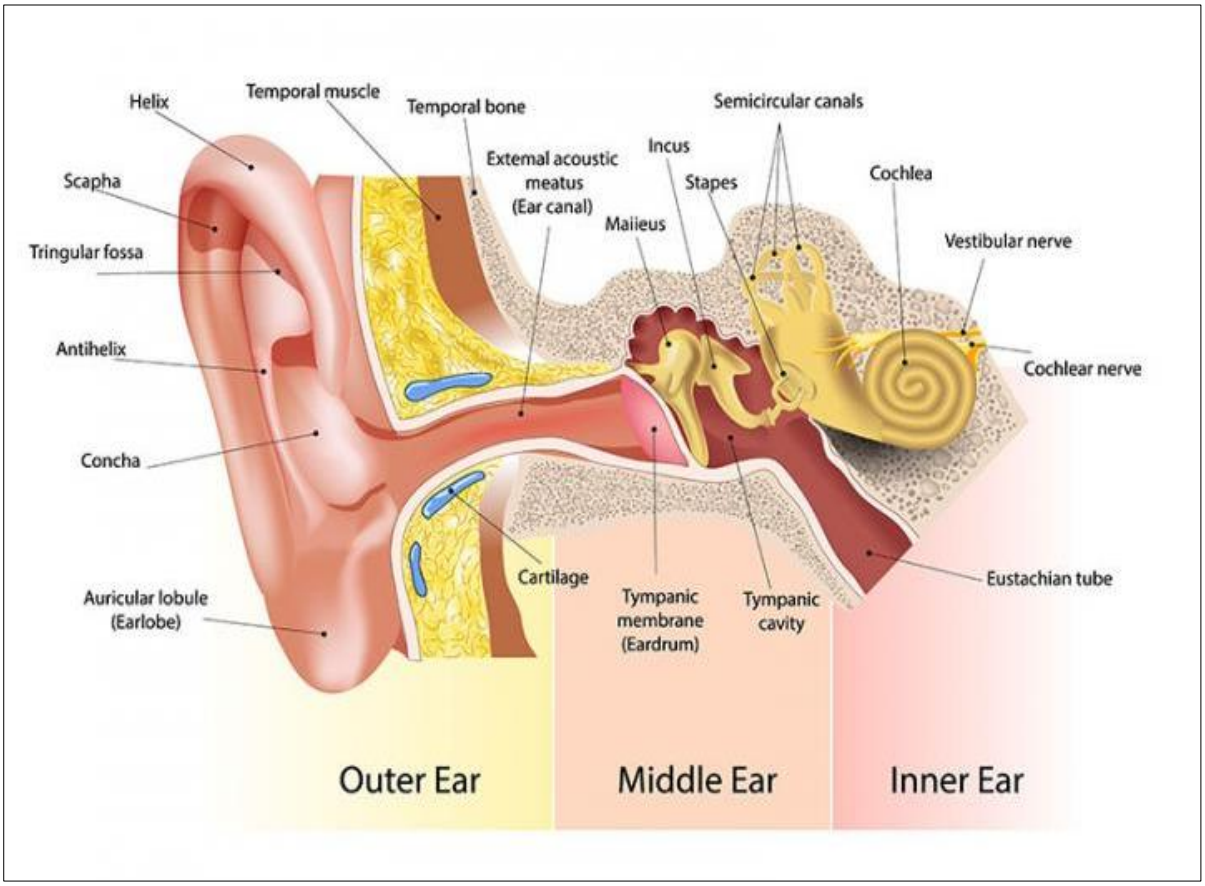


Fig. 1 Anatomy of the Ear

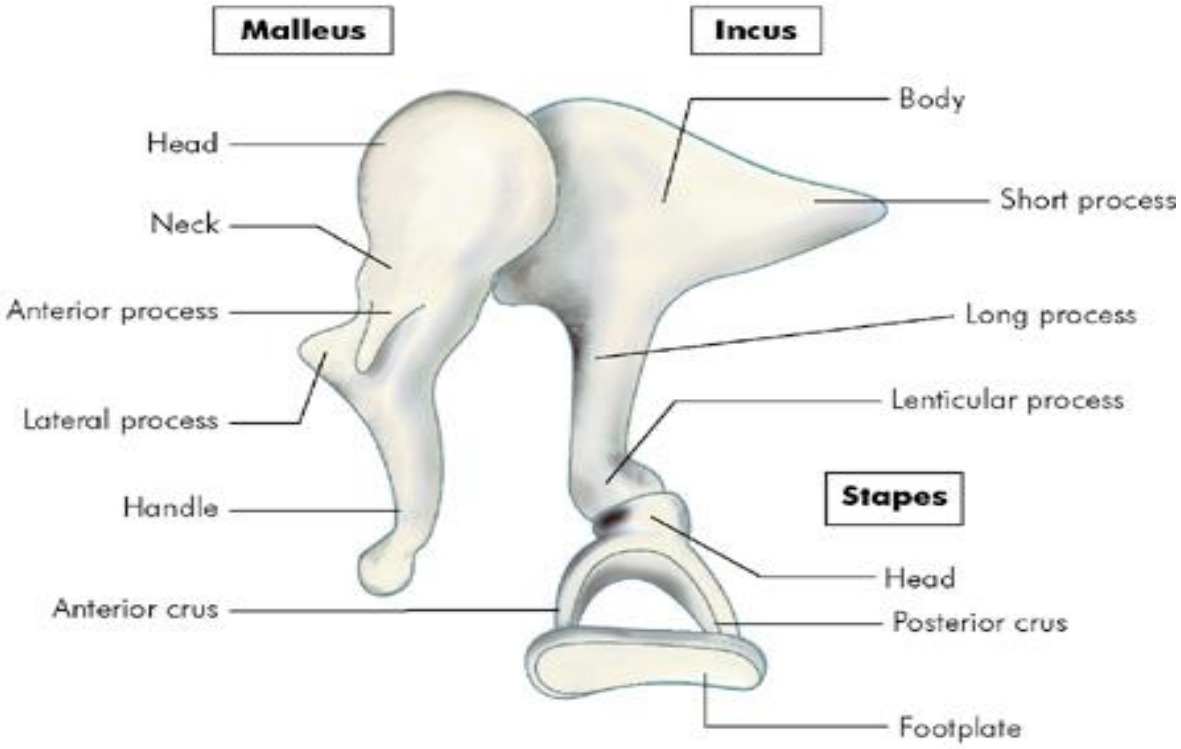


Fig 2 – Ear Ossicles

A. EXTERNAL EAR

It includes

1. **Pinna** – It is made up of single yellow elastic cartilage except for lobule which consists of fat. It consists of a lateral surface and medial surface. Its lateral surface has various depressions and elevations.
2. **External Auditory canal** – It is 24 mm in length divided into inner bony and outer cartilaginous parts. It is S shaped.

   Outer cartilaginous part is 8 mm in length, running downwards, forwards and laterally. Consists of hair follicles, sebaceous glands and ceruminous glands whereas inner bony part 16 mm in length with direction downward backwards and laterally is devoid of it. It also has 2 deficiencies- Foramen of Huschke present in the bony part and Foramen of Santorini present in the cartilaginous part. The bony walls are made up of tympanic, squamous and mastoid portions of temporal bone.

   RELATIONS OF EAC – Roof is formed by middle cranial fossa, inferiorly lies the infratemporal fossa, anteriorly lies the parotid gland and posteriorly is mastoid process.

MICROBIOLOGY OF EAC – The human EAC is described as "skin lined tube with blood supply" as it gives nutrients, moisture, warmth for growth of micro-organisms. Staphylococcus aureus and Corynebacterium diphtheria species make up 87% and 81% respectively the normal ear flora. Pseudomonas species not found.

3. **Tympanic Membrane** – It forms a boundary between the external ear and the middle ear. It is a pearly grey color. It is oval shaped with a thick outer fibrocartilaginous ring called the tympanic annulus and is set inside a groove the tympanic sulcus. Set at an angle of 55 degrees with the horizontal. It is 9-10 mm in length, 8-9 mm in width and 0.1 mm in thickness. Pars tensa is divided into three layers – outer epithelial layer, middle fibrous layer and inner mucosal layer.

B. MIDDLE EAR

Middle ear is like a six-sided box; The tympanic cavity in the temporal bone between the tympanic membrane and the osseous labyrinth.

It is an air-filled cavity divided into Epitympanum – part above the pars tensa; Mesotympanum – part in front of the pars tensa; Hypotympanum – part below the pars tensa and Protympanum – part in front of the Eustachian tube.

1. Roof

It is formed by a thin plate of bone called tegmen tympani separating middle ear from middle cranial fossa. It comprises of petrous and squamous portions of temporal bone.

2. Floor

It is made up of a compact bone separating hypo tympanum from jugular bulb. Also, tympanic branch of glossopharyngeal nerve enters the tympanic cavity through a small opening at the junction of medial and posterior wall.

3. Anterior Wall

It separates middle ear cavity from internal carotid artery.

It has 4 openings from above downwards

a) Canal of Huguier through which chorda tympani exits the middle ear
b) Tensor Tympani
c) Eustachian tube

d) Glasserian fissure which transmits the tympanic artery and anterior ligament of malleus.

4. Lateral Wall

It is formed by tympanic membrane and outer attic wall.

5. Medial Wall

It consists of promontory which is bulge of basil coil of cochlea.

Oval window lying above and behind the promontory and covered by the stapes footplate and its surrounding annular ligament. It is kidney shaped and measures 3.2x1.7mm

Round window lies below the promontory, bounded superiorly by the ponticulus and subiculum and posteriorly by the sinus tympani.

It also consists of canal for facial nerve which runs superior to the oval window and descends inferiorly on the posterior wall. It is marked anteriorly by the processus cochleariformis which houses the tendon of tensor tympani and is also the landmark for first genu of facial nerve i.e. geniculate ganglion.

6. Posterior Wall

It has an opening aditus which connects mastoid antrum to the attic. Below the aditus is fossa incudis and below the fossa is the pyramid which houses the stapedius tendon and muscle. Also present is the facial recess which is bounded superiorly by fossa incudis, laterally by chorda tympani and medially by vertical part of facial nerve.

CONTENTS OF MIDDLE EAR

- Ossicles

Malleus – Shaped like a hammer. Largest of the three ossicles. It is the largest of the 3 ossicles. It has a head, neck, handle & 2 processes – anterior and lateral. Overall length ranges from 7.5-9mm. The head and neck of malleus lies in the attic, lateral process gives attachment to anterior and posterior malleolar folds.

Incus – It is in the shape of an anvil. Measures 6x6 mm.

Stapes – It is the smallest ossicles. Shaped like a stirrup. Has head, neck, 2 crura and a footplate. Dimensions of footplate are 3.2x1.7mm

- Air
- Tympanic plexus
- Intratympanic muscles

  Stapedius – originates from the pyramid and inserted onto the neck of stapes. It is supplied by the facial nerve.

  Tensor Tympani muscle arises from anterior wall from mesotympanum, loops around the processus cochleariformis and inserts onto neck of malleus. Supplied by mandibular nerve.

C. INNER EAR

It has 2 parts

1. **Bony Labyrinth** – vestibule, cochlea and semicircular canal
2. **Membranous labyrinth** – saccule and utricle, membranous semicircular ducts with bony canals.

Microbiology of healthy ear[18]

Gram positive organisms

- Staphylococcus auricularis
- Staphylococcus capitis
- Staphylococcus epidermidis
- Staphylococcus aureus
- Staphylococcus hemolyticus
- Diphtheroides
- Enterococcus fecalis
- Micrococci spp.
- Bacillus spp

Gram negative organisms

- Pseudomonas aeruginosa

- Pseudomonas stutzeri
- Acinetobacter spp.
- Stenotrophomonas maltophila
- Chryseobacterium Indologenes
- Proteus mirabilis
- Moraxella catarrhalis
- Moraxella osloensis

TYPES OF OTITIS MEDIA

1. **TUBOTYMPANIC TYPE/ SAFE TYPE/ MUCOSAL TYPE**
2. **ATTICOANTRAL TYPE/ UNSAFE TYPE/ SQUAMOSAL TYPE**

TUBOTYMPANIC TYPE

It includes a permanent perforation of the tympanic membrane with or without inflammation of mucosa i.e. active or inactive mucosal disease. In active disease there is edema of the mucosa of the middle ear and mastoid, submucosal fibrosis and hypervascularity of mucosa and secretion from mucoid glands in the middle ear mucosa leading to mucopurulent discharge. It involves the anteroinferior part of tympanic cavity.

ATTICO ANTRAL TYPE

It is also classified as inactive and active disease. Due to persistent negative middle ear pressure, there is in pouching of tympanic membrane into middle ear called as retraction pocket. Active type includes retention of keratin debris in pockets leading to cholesteatoma formation. It can lead to osteitis producing malodorous discharge from the ear and can also lead to complications. [19]

ETIOLOGY

In 2012 Vishwanath S et al conducted a prospective study to determine microbiological profile and antibiogram of chronic suppurative otitis media. It was carried out on 94 randomly selected patients between 1-78 years of age. Most common organism in the study was Pseudomonas aeruginosa (37.2%), followed by Staphylococcus aureus (19.1%). It was observed that microbiological profile with clinical correlation is required for exact choice of antibiotic.[20]

Malkappa SK et al in 2012 conducted a study in Agartala on 130 patients with history of chronic discharging ear. Out of the total samples - most common isolate was Preudomonas aeruginosa species and Staphylococcus aureus and Amikacin was found to be most effective against maximum number of strains followed by Ciprofloxacin.[21]

Aggarwal A et al in 2013 studied 125 patients suffering from chronic suppurative otitis media and it was observed that monomicrobial atiology was found to be most common in this study. It was further stated that evaluation of microbiological pattern and their antibiotic sensitivity pattern in local area become helpful in prescribing empirical antibiotics for successful treatment of otitis media and reducing emergence of resistant strains.[22]

Induradhan R studied 382 swabs with the major organisms isolated were Pseudomonas aeruginosa (27.2%), followed by Staphylococcus aureus (23.6%).[23]

In 2017 Basnet R et al conducted a cross sectional analytical study on 200 patients of clinically diagnosed otitis media. During the study it was observed that gram negative isolates were higher than gram positive isolates with most effective antibiotic found to be Amikacin against Gram positive and negative bacteria.[24]

Raju RKLM studied 120 cases and concluded that the most common organism isolated was Pseudomonas aeruginosa (20.83%) followed by E. coli (14.16%), staphylococcus aureus (19.16%).[25]

NR Smitha in 2018 studied 520 patients with complaints of unilateral or bilateral ear discharge for more than 3 months. Out of 520 samples, a total of 499 anaerobic bacteria were isolated, of which Staphylococcus aureus was predominant, followed by Pseudomonas species, Escherichia coli, Klebsiella pnemoniae, Citrobacter species, Proteous species. Staphylococcus aureus with Pseudomonas species was the most common polymicrobial growth pattern observed.[26]

Govindhraj S in 2019 studied a total of 60 patients comprising 24 males and 36 females.In the study, Pseudomonas species was the most commonly isolated bacteria, seen in 38% of isolates followed by the Escherichia coli in 22% of isolates, followed by Staphylococcus aureus 18%.[27]

In 2019 Molla R examined a total of 62 ear was 74 bacterial isolates were identified out of which 48 (77.4%) sample had mono microbial growth, II (17.8%) with polymicrobial growth and the remaining 3 (4.8%) show no growth. Out of the 74 isolates, Gram positive bacteria were 24 (32.4%), while 50 (67.6%) were Gram negative bacteria. The most common isolated organism were P. mirabilis (16; 21.6%) then S. aureus 12; (16.2%), coagulase negative Staphylococus (CONS) (12; 16.2%), Providencia spp (11;14.9%), Klebsiella spp (10; 13.5%), Citrobacter spp (5.68%), Enterobacter app. (4; 5.4%), P. vulgaris (2; 2.7%), and Pseudomonas spp. (2; 2.7%). [28]

Predisposing factors:

A. AGE

Prevalence and incidence of otitis media is more in young age and pre-school children.

Factors affecting are:

- Adenoid hypertrophy
- Low immunocompromise
- Recurrent respiratory infection

First episode of otitis media acts as an initiating event for inflammatory process of middle ear mucosa and predisposes child to recurrent episodes of otitis media.

B. RACE

American Indians are found to be more susceptible to otitis media than American whites, Incidence of chronic suppurative otitis media varies in different population, highest in Eskimos, Australian aborigines.

C. SEX

Boys are more prone to otitis media than girls which may be a reflection of anatomical and growth differences.

D. EUSTACHIAN TUBE DYSFUNTION

It refers to detect in ventilatory function of Eustachian tube. It is common in people with chronic suppurative otitis media. Ventilatory defect contributes to the onset and persistence of chronic otitis media.

E. PALATAL PROBLEMS

F. ALLERGY

G. CRANIOFACIAL ABNORMALITIES

Syndromes with skull base defects are likely to have otitis media.

e.g. – Down's Syndrome

Fragile X syndrome

CLINICAL FEATURES

SYMPTOMS

1. EAR DISCHARGE

- Intermittent/Continuous
- Mucopurulent/mucoid discharge in tubotympanic variety & purulent in attico antral type
- Foul smelling discharge seen in attico-antral disease & secondarily infected tubo-tympanic type. Non foul smelling discharge seen in tubotympanic variety.
- Blood tinged discharge seen in attico antral type due to osteitis.
- Profuse in quantity seen in tubo-tympanic type whereas scanty seen in attico antral type

2. HEARING LOSS

- Mainly conductive hearing loss due to damage to ossicles.
- Sensorineural component is also seen when toxins enter the inner ear affecting the cochlea.

3. OTALGIA

- It is seen in cases of complications or external ear infection.

4. TINNITUS

5. **VERTIGO**

- Seen in labyrinthitis and perilymphatic fistula

6. **Fever, diplopia, vomiting, headache** are seen associated with complications

SIGNS

1. **EXTERNAL EAR**

- Check for position of pinna, preauricular and postauricular region for any sinus, scars
- Presence of mucopurulent/mucoid discharge in external auditory canal. Scanty discharge can be checked in anterior recess.
- Granulations can be seen in external auditory canal
- Polyp can be seen filling the external auditory canal

2. **EXAMINATION OF TYMPANIC MEMBRANE**

- Color
- Retractions, mobility
- Cone of light
- Perforation – size, shape, quadrants involved, involvement of attic, margins
- Examine the middle ear mucosa and structures seen through perforation

3. Tenderness over post auricular region, mastoid
4. Tuning fork test
5. Check for facial nerve
6. Examine nose and paranasal sinus
7. Examine oral cavity, oropharynx, posterior pharyngeal wall

INVESTIGATIONS

- **HEARING ASSESSMENT**

Pure tone audiometry is done to assess for type of hearing loss i.e., conductive, sensorineural or mixed loss and degree of hearing loss

- **AURAL SWAB**

  For culture & sensitivity and antibiotic susceptibility

- **X-RAY NASOPHARYNX**

  To check for adenoids in young age group

- **CT SCAN**

  To check for presence of any anatomical abnormality, soft tissue density, as a road map for surgery, to rule out intracranial complication

TREATMENT

GOALS OF MANAGEMENT

- Symptomatic Relief
- Elimination of infection
- Ventilation of middle ear and mastoid
- Prevention of further infection
- Avoidance of complications

MEDICAL MANAGEMENT[29]

- **AURAL TOILET**

  It includes dry mopping, suctioning of ear discharge

- **TOPICAL TREATMENT**

  These oto-topical ear drops reach the organism in mucous form and faster than oral antibiotics

  Gentamicin 0.3% ear drops are effective against organisms

  Neomycin, ciprofloxacin, polymyxin B ear drops are also effective against organisms with or without corticosteroids

- **SYSTEMIC ANTIBIOTICS**

  Systemic antimicrobials are indicated in cases of

- Acute stages of CSOM
- During post-operative treatment of the ear
- CSOM which is not controlled by topical antibiotics and aural toilet
- CSOM with threatened complications

In a study by Dhillon V et al conducted on 80 patients was seen that Pseudomonas aeruginosa is the most common organism with most sensitive to ciprofloxacin followed by ceftazidime.[30]

In another study by YK Harshika conducted on 130 cases of CSOM Pseudomonas aeruginosa (33.9%) was again found to be most common organism in the aetiology of CSOM followed by Staphylococcus aureus (21.58%) and most sensitive drug was found to be Amikacin, followed by imipenem and ciprofloxacin. In the study few fungal isolates were also seen.[31]

In 2012 A Yousuf concluded that as topical ear drops gentamicin (82.6%), followed by neomycin (67.8%) were susceptible for organisms Staphylococcus aureus (40%) followed by Pseudomonas aeruginosa (16%) according to their study.[32]

Taneja M.K. emphasised on the use of cefotaxime, amikacin, norfloxacin, netilmicin and gentamicin for the treatment of CSOM.[33]

Loy A.H.C., Tan A.L. and Lu P.K.S. in 2002, conducted gentamicin as an effective topical antibiotic in the treatment of CSOM. It was found that Pseudomonas aeruginosa was sensitive to ceftazidime, ciprofloxacin, piperacillin and amikacin while Staphylococcus aureus was sensitive to cephalexin, cloxacillin, clindamycin.[34]

Charles D. Bluestone in 2004, emphasised on use piperacillin and sulfamethoxazole-trimethoprim against Ps. Aeruginosa and also observed that Pseudomonas were resistant to aminoglycosides but have showed excellent susceptibility to norfloxacin.[35]

- **ANTIHISTAMINICS AND DECONGESTANTS**

  To reduce congestion of Eustachian tube as well as shrinkage of nasal mucosa
- **OTHER MEDICAL TREATMENT**

a) **Mucolytic agent** – Acetylcysteine by its mucolytic property helps to liquify the discharge and assists in its clearance from the middle ear at quicker time

b) **Burrow's solution** – It is 13% aluminium acetate. It is clear, colourless liquid with a faint acetous odour and a sweet taste made by adding glacial acetic acid. It inhibits Ps. Aeruginosa, Staph. Aureus, Proteus spp, Strept. Pyogenes. Dilutions ranging from 1:80 to 1:60 will inhibit growth of all commonly occurring organisms found in CSOM.[36]

SURGICAL TREATMENT[37]

Goals of surgical intervention

1) Control of infection
2) Restoration of function

Indications

Presence of threatened or actual complications

Presence of irreversible pathologic conditions in the mastoid or middle ear, such as cholesteatoma, osteomyelitis or sequestration.

Lack of response to an adequate medical regimen, indicating the presence of a pathologic process requiring surgery.

1. **Adenotonsillectomy**
   To remove the focus of infection.
2. **Submucosal resection (SMR)**
   To correct DNS (Deviated Nasal Septum)
3. **Polypectomy**
   To remove the nasal polyps.
4. **Surgical treatment for chronic sinusitis like**

- Functional endoscopic sinus surgery (FESS)
- Caldwell Luc operation

5. **Cortical mastoidectomy**

6. **Modified radical mastoidectomy**

   An operation to eradicate disease of the middle ear and mastoid in which the mastoid and epitympanic spaces are converted into an early accessible common cavity by removal of posterior and superior external canal walls.

7. **Radical mastoidectomy**

   The object of radical mastoidectomy is to combine the middle ear, attic and mastoid cavity into a single draining through the external canal.

   Indication

   Tumours of middle ear or external meatus. It is rarely indicated today because it involves severe loss of function.

8. **Myringoplasty**

   An operation in which the reconstructive procedure is limited to repair of a tympanic membrane perforation with temporalis fascia graft.

   Indications

   Cases in which chronic or recurrent infection has been controlled.

   Perforations of traumatic origin, accompanied by a hearing loss of less than 20 db.

9. **Tympanoplasty without mastoidectomy**

   An operation to eradicate the disease in the middle ear and to reconstruct the hearing mechanisms without mastoid surgery, with or without tympanic grafting.

   Indications

   Simple chronic otitis media

   Chronic adhesive otitis media

   Tympanosclerosis

10. **Tympanoplasty with mastoidectomy**

An operation to eradicate the disease in both the mastoid process and middle ear cavity and to reconstruct the hearing mechanism with or without tympanic membrane grafting.

Indication

When there is extension of the pathologic process into the mastoid air cell system.

PREVENTION

General measure

- Maternal education
- Proper feeding position
- Improvement in personal hygiene, literacy and socio-economic status

In 2020 BP Sah et al studied 112 patients, 70 (62.5%) were females. Among 112 swab cultures, 98 (87.5%) were positive for the growth of organism and 14 (12.5%) were sterile cultures. Among them Staphylococcus aureus (42.24%), Pseudomonas aeruginosa (28.44%), Klebsiella pneumoniae (10.34%), Acinetobacter anitratus (6.9%), Proteus mirabilis (5.17%) and E. coli (4.31%) were the common microbial isolates. Among the antibiotics commonly available as topical eardrops, Ofloxacin (91.83%)) had the highest susceptibility rate, followed by Ciprofloxacin (81.63%), Tobramycin (73.46%) and Gentamicin (63.26%). Staphylococcus aureus was the most common organism isolated. Ofloxacin had the highest susceptibility rate against the isolated organisms.[38]

In 2021 Jianghong Xu et al examined 289 cases in which bacterial pathogens were found in 223 (77.2%). A total of 236 strains were isolated. There were 18.9% methicillin-resistant S aureus (MRSA) among the obtained S aureus organisms. Multidrug-resistant P aeruginosa was found in 4 patients, making up 10% of all detected P aeruginosa. Staphylococcus aureus showed highest susceptibility to vancomycin (100%), then gentamicin (98.1%) and rifampicin (97.2%) and was most resistant to penicillin (61.3%) and erythromycin (50%). High degree of

resistance in P aeruginosa was observed toward levofloxacin (42.5%), ciprofloxacin (40%), and ceftriaxone (30%).[39]

In 2021 Wan Nur Anis Wan Draman et al found microbial growth in 85 (93.4%) samples, but 6 (6.6%) samples had no growth. Among the samples with growth, 63 (69.2%) were monomicrobial, 13 (14.3%) were polymicrobial, and 9 (9.9%) were of mixed growth with more than three microorganisms. The most common bacteria isolated was Pseudomonas aeruginosa (32.6%) followed by Staphylococcus aureus (16.9%) and Klebsiella spp. (5.6%). S aureus showed the highest sensitivity toward rifampin, cefoxitin, and fusidic acid.[40]

In 2021 Raid M Al-Ani et al studied 3634 outpatient subjects, 102 (2.8%) presented with active CSOM. The age range of the patients was 1–70 years (mean 28.90 ± 19.8). There were 58 females (56.9%). Out of 117 ear swab specimens, 107 (91.5%) yielded positive cultures. The majority (101, 94.4%) of the specimens yielded a single organism. There was a high statistically significant difference ($p < 0.001$) between gram-positive ($n = 77$, 68.1%) and gram-negative pathogens ($n = 36$, 31.9%). Pseudomonas aeruginosa in 65 (57.5%) cases and Staphylococcus aureus in 19 (16.8%) cases were the two most commonly isolated organisms. The drugs imipenem (93.8%), amikacin (86.1%), azteronam (83.1%), and ciprofloxacin (81.5%) were effective against P. aeruginosa ($p < 0.001$). Amikacin (100%), imipenem (94.7%), ciprofloxacin (68.4%), and gentamicin (63.1%) were the most effective antibiotics against Staph. aureus ($p < 0.001$). [41]

In 2021 K YADAV et al studied 200 patients, 114 (57%) were males and 86 (43%) females. Among the 200 cases, 147 (73.5%) cases showed growth and 53 (26.5%) showed no growth. The most common organism isolated in this study was Pseudomonas aeruginosa, 67 (42.40%) followed by Staphylococcus aureus. 48 (30.37%) and Klebsiella spp. 23 (14.55%). Gentamicin (85%) and amikacin (83%) had high level of antibacterial activity on all the isolates. Most of the isolates were sensitive to meropenem.[42]

In 2021 M Alam et al examined 322 patients in which 341 cultures were positive. The culture results revealed different aerobic microbes. Gram-positive floras were seen in 152 (44.57%), and Gram-negative in 189(55.43%) isolates. Staphylococcus aureus was the most common isolate present in 131 samples (38.41%), followed by pseudomonas aeruginosa in 101 (29.62%) and proteus in 36 (10.56%). For Gram-negative microbes, Piperacillin–Tazobactum combination was most effective with overall susceptibility of 79.37% susceptibility.[43]

In 2021 M Ullah et al studied 196 patients of both gender and age between 13 to 60 years with clinical diagnosis of active chronic otitis media. Bacterial isolates were analyzed as 48% Staph aureus, 28% Pseudomonas, 12% Proteus mirabilis, 8% E. coli and 4% Klebsiella spp. Imipenem was sensitive to 94%, ceftriaxone 84%, ciprofloxacin 80%, co-trimoxazole 66%, ampicillin 63%, cefixime 45% and co-amoxiclav against 43% of total bacterial isolates. Imipenem was the most sensitive antibiotic against majority of bacterial isolates.[44]

In 2022 R Agarwal found that the commonest organism isolated as P. aeruginosa in 36.36% of cases followed by S. aureus in 25.45% of cases. Proteus mirabilis, Acinetobacter baumannii, and Escherichia coli were isolated in 5.45% cases each. Coagulase-negative staphylococci (CoNS), K pneumoniae, were isolated in 3.63% of cases. The fungal isolates that predominate include Aspergillus niger 7.27% cases, followed by 1.81% of Aspergillus flavus, Candida tropicalis, and Candida each , Staphylococcus aureus and Pseudomonas aeruginosa are the most typical causes of ear infections. Ciprofloxacin was responsive to the majority of the isolates.[45]

In 2022 A Garg et al examined 370 samples, 353 (95.40%) were culture positive. Seventeen samples were culture negative. 13.51% of the samples showed mixed growth. The most common organism isolated in this study was Pseudomonas species (28.37%) followed by S. aureus (12.43%), Enterobacter spp. (4.59%) Proteus spp. (4.32%), Klebsiella spp. (1.62%), and Coagulase Negative Staphylococcus (7.56%) were the other organisms isolated. It showed 92.39% susceptibility to amikacin, 90.48% susceptibility to gentamicin, and 80.96% to fluoroquinolones.[46]

In 2022 SA Auda et al studied 85 samples swab samples from patients with otitis media. Bacterial growth was detected in 62 (72.9 %) as a positive culture. 36 isolates were successfully diagnosed as P. aeruginosa, representing 42.35 % of total isolate. The highest percent of resistance among isolates was to Erythromycin (83.35) Piperacillin (75%), Tobramycin (63.8%), norfloxacin (58.3%), Gentamicin (55.5%) and Ciprofloxacin (52.7%). colistin was the most effective as (91.6%) of isolates was sensitive and imipenem with (50 %) sensitive.[47]

In 2022 GY Naik et al examined 142 patients, most common age group was 11-20 years. CSOM was found to be more common in females (56.33%) than in males (43.66%). The most common bacterial isolate was Pseudomonas aeruginosa (45.8%) followed by Staphylococcus aureus (30.5%), Proteus mirabilis (13.8%), Acinetobacter baumannii (2.7%), Klebsiella

pneumonia, Micrococcus, E. Coli, Citrobacter and Providentia species. Pseudomonas aeruginosa was found to have maximum sensitivity to Polymyxin B (87.8%) and least sensitive to amoxicillin (15.1%). Among Staphylococcus aureus (87% MRSA and 13% MSSA) maximum isolates were sensitive to piperacillin+tazobactam (90.9%) and least sensitive to amoxicillin (13.6%).[48]

In 2022 Zubaidah H. Mahmood Agha et al examined 200 ear swabs, 95% confirmed positive culture; 85.8% were bacterial isolates. From the total bacterial isolates, 57% were gram-positive bacteria, while gram-negative bacteria were 43%; with predominant of Pseudomonas aeruginosa, (22%) followed by Staphylococcus aureus (19%) and Coagulase negative Staphylococci (18%). 64.1% of the isolates were characterized as MDR, 31.7% were XDR, with one (0.7%) as PDR. Among these, 60.7% isolates were ESBL producers, Pseudomonas aeruginosa was the most frequent ESBL- producing isolates (45.9%), followed by Proteus spp (18.9%). The in-vitro sensitivity results indicated that Gentamycin and Ciprofloxacin were effective antibiotics in the treatment of otitis media. Additionally, Meropenem, Imipenem, Cefepime, and Azetronam were also the most effective drug against Pseudomonas aeruginosa.[49]

In 2022 AS Doshad studied et al 100 CSOM patients, 59 (59%) patients were female. Unilateral infection (68.24%) was more common than bilateral (27.34%). 89 (89%) cultures were positive for the growth of organism and 11(11%) were sterile cultures. Most common organisms isolated were Staphylococcus aureus 43(41.75%) and Pseudomonas aeruginosa 31(30.09%). CSOM has more preponderance in female gender. Ofloxacin was the highest antibiotic susceptibility rate.[50]

MATERIALS & METHOD

- **Organization:** Santosh Medical College and Hospital, Ghaziabad, UP
- **Study Setting:** Department of ENT, Santosh Medical College and Hospital, Ghaziabad, UP
- **Type Of Study:** Cross-Sectional study
- **Study Population:** Patients Visiting in ENT Opd at SMCH with Chronic Suppurative Otitis Media.
- **Study Period:** October 2020 to April 2022
- **Consent & Approvals:** Ethical approval will be taken from the institutional ethical committee.
- **Sampling Technique:** Simple Random Sampling

$$n = \frac{Z1^2 - \frac{\alpha}{2} P(1-P)}{d^2}$$

$Z\alpha = Level\ of\ Significance\ (1.96\ at\ 5\%)$, **P = Prevalence (7.8%), d = absolute error (i.e. 5%)**

So, n ≥ 110 (Sample Size)

INCLUSION CRITERIA:

1. Both sexes
2. Discharge for more than 12 weeks
3. Unilateral/Bilateral
4. Central perforation
5. No treatment systemic or topical in last 7 days

EXCLUSION CRITERIA:

1. Dry Ear
2. Individuals who have taken systemic or topical antibiotics in last 7 days.
3. Otomycosis
4. Otitis Externa

METHODOLOGY

HISTORY TAKING: After Consent, Patient was evaluated properly based on history. Proforma was filled for each patient documenting age, sex, socio economic status, clinical information, including chief complaint, duration of symptoms.

CLINICAL EXAMINATION: Thorough examination of Ear, Nose and Throat was carried out using appropriate Instruments.

SAMPLE COLLECTION:

In the chosen patients, the external ear was cleansed using sterile cotton swabs moistened with normal saline. Patient was made to lie supine on the couch and a sterile aural speculum was introduced in external auditory canal to avoid contamination.

Sterile swab stick was introduced into the ear by viewing under the microscope and rotated to collect the discharge. 2 swabs were taken discharging ear – 1 for gram staining 2 – for bacterial culture.

Swab sticks were put into a clean, sterile, capped tube and sent for culture.

Each sample was labelled with date, time, patient's full name, age sex, referring doctor, department, OPD/IPD number and requisition form was giving along with sample for submission in Microbiology Lab.

GRAM STAINING:

The swab is smeared on a clean glass slide and is fixed with 95% methanol, by pouring one or two drops on the smear and allowed to act for at least of 120 seconds or till the methanol dries on the smear.

Gram staining is done for the smears so made and is examined under the microscope to note the various morphological types of bacteria, their number, gram reaction.

CULTURE:

The second sample swab was inoculated on the following culture media

- Blood agar plate
- Mac Conkey agar plate

After overnight incubation at 37 degrees C aerobically, the plates were examined for growth and culture characteristics were identified.

The isolates were identified by Gram stain morphology, culture characteristics and biochemical reactions by the standard techniques.

Antimicrobial susceptibility of bacterial isolates to commonly used antibiotics was done using Mueller Hinton media.

Follow up was done on Day 4 with culture and sensitivity reports. Then depending on the sensitivity report, appropriate antibiotic will be prescribed to the patient and 2nd follow up will be after 7 days of prescribing the antibiotic found to be sensitive.

FIGURE 3: HDPE SWAB STICK

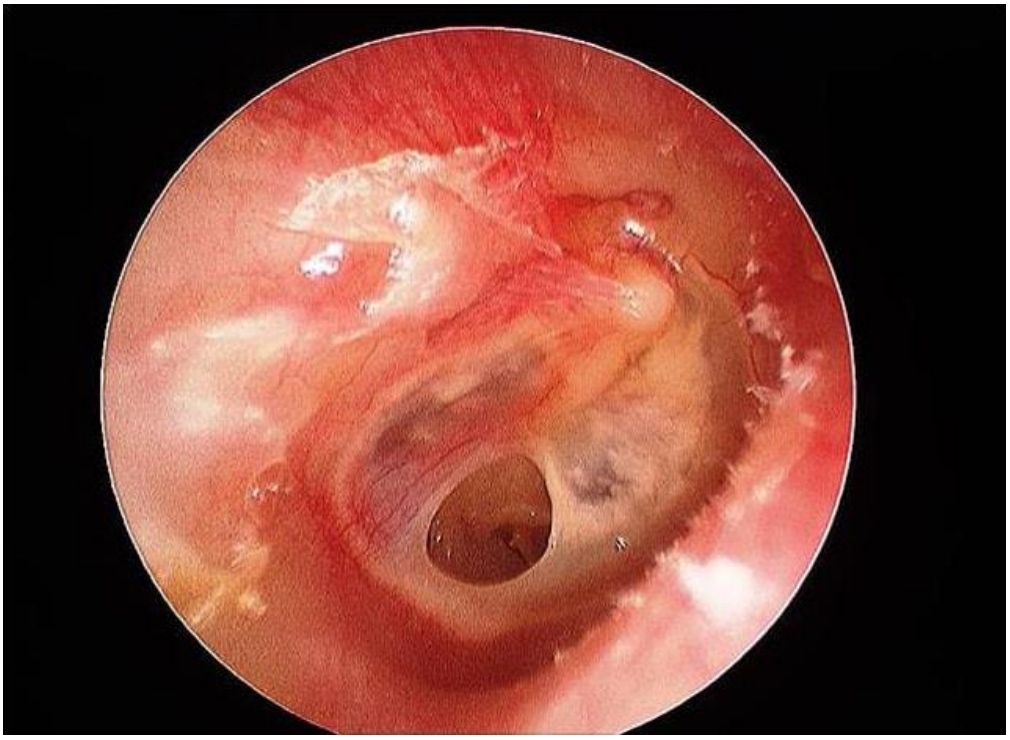


FIGURE 4: TYMPANIC MEMBRANE PERFORATION

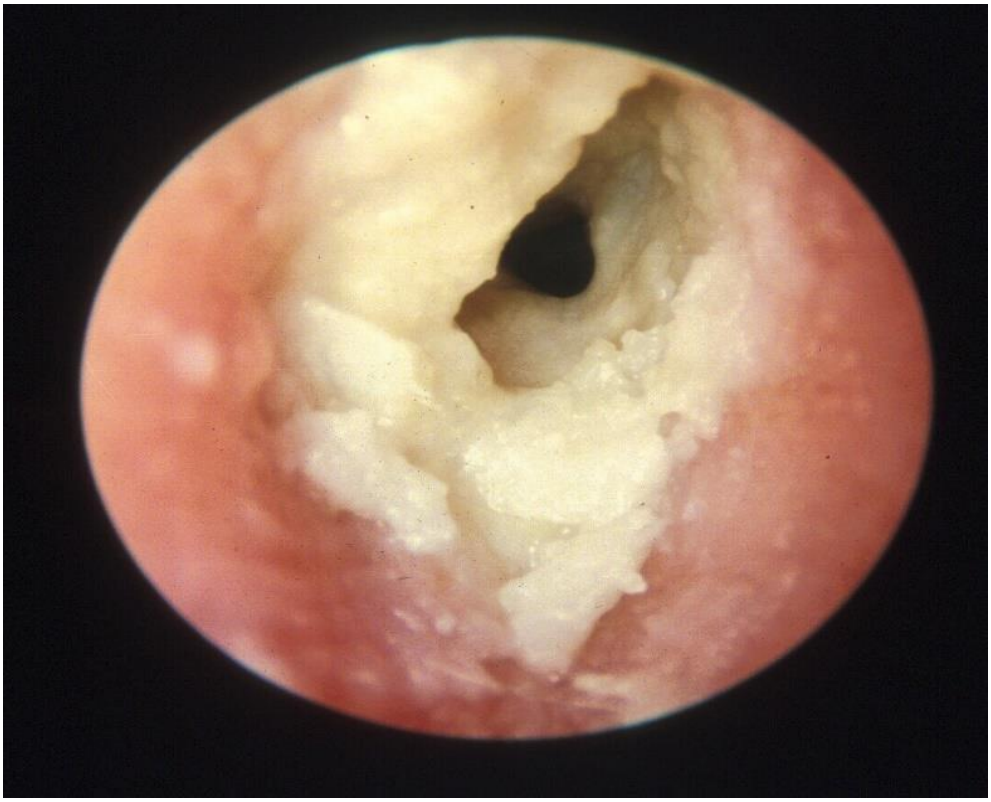


FIGURE 5: DISCHARGE IN THE EAR

FIGURE 6: MAC CONKEY'S AGAR

FIGURE 7: BLOOD AGAR

FIGURE 8: MUELLER HINTON AGAR

STATISTICAL ANALYSIS

- The data will be collected and entered in MS excel (latest version), All the data will be represented in the form of number and percentages.
- Graphical representation of the variable will be shown to understand the results clearly and to measure the association for categorical dataset will be analysed using Appropriate Test.

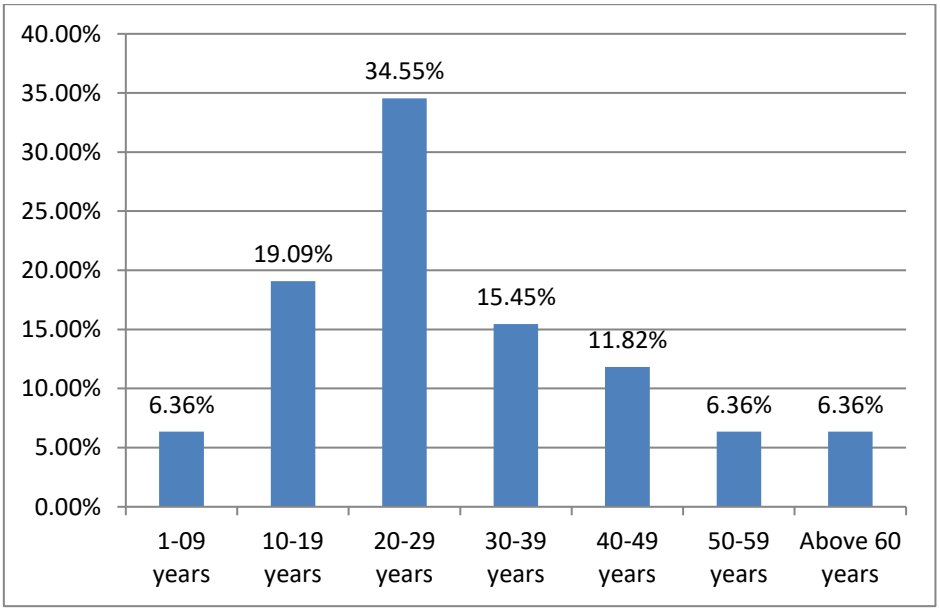
RESULTS AND OBSERVATION

A total 110 patients of CSOM who satisfied the inclusion criteria were included in the study. Out of 110 patients (122 samples were collected), 97 were culture positive, whereas 25 showed no growth.

TABLE 1: AGE WISE DISTRIBUTION

Age groups	Frequency	Percent
1-09 years	7	6.36%
10-19 years	21	19.09%
20-29 years	38	34.55%
30-39 years	17	15.45%
40-49 years	13	11.82%
50-59 years	7	6.36%
Above 60 years	7	6.36%
Total	110	100%

Of study population, 7 (6.36%) cases belonged to 1-09 years, 21 (19.09%) belonged to 10-19 years, 38 (34.55%) belonged to 20-29 years, 17 (15.45%) belonged to 30-39 years, 13 (11.82%) belonged to 40-49 years, 7 (6.36%) belonged to 50-59 years and 7 (6.36%) belonged to above 60 years age group.

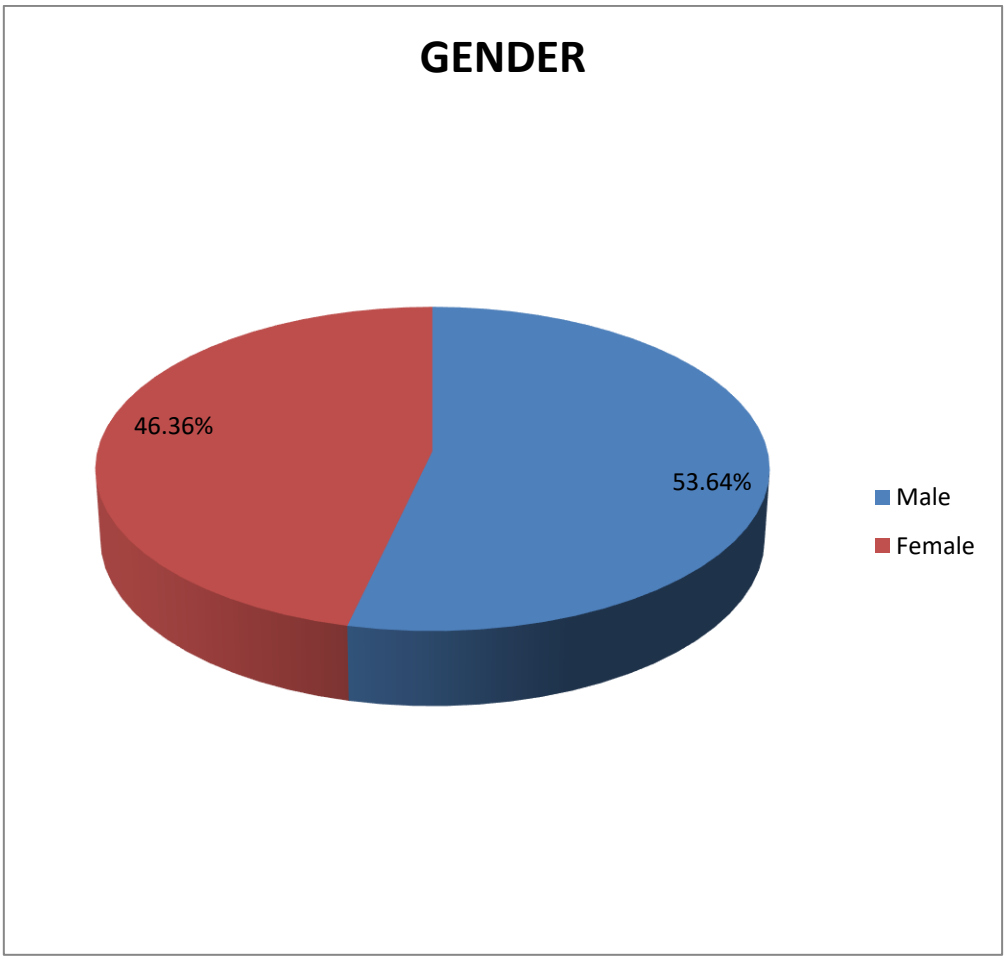


GRAPH 1. AGE WISE DISTRIBUTION

TABLE 2: GENDER WISE DISTRIBUTION

Gender	Frequency	Percent
Male	59	53.64%
Female	51	46.36%
Total	110	100%

Gender distribution was studied and it was seen that males outnumbered the females. There were 59 (53.64%) males and 51 (46.36%) females.

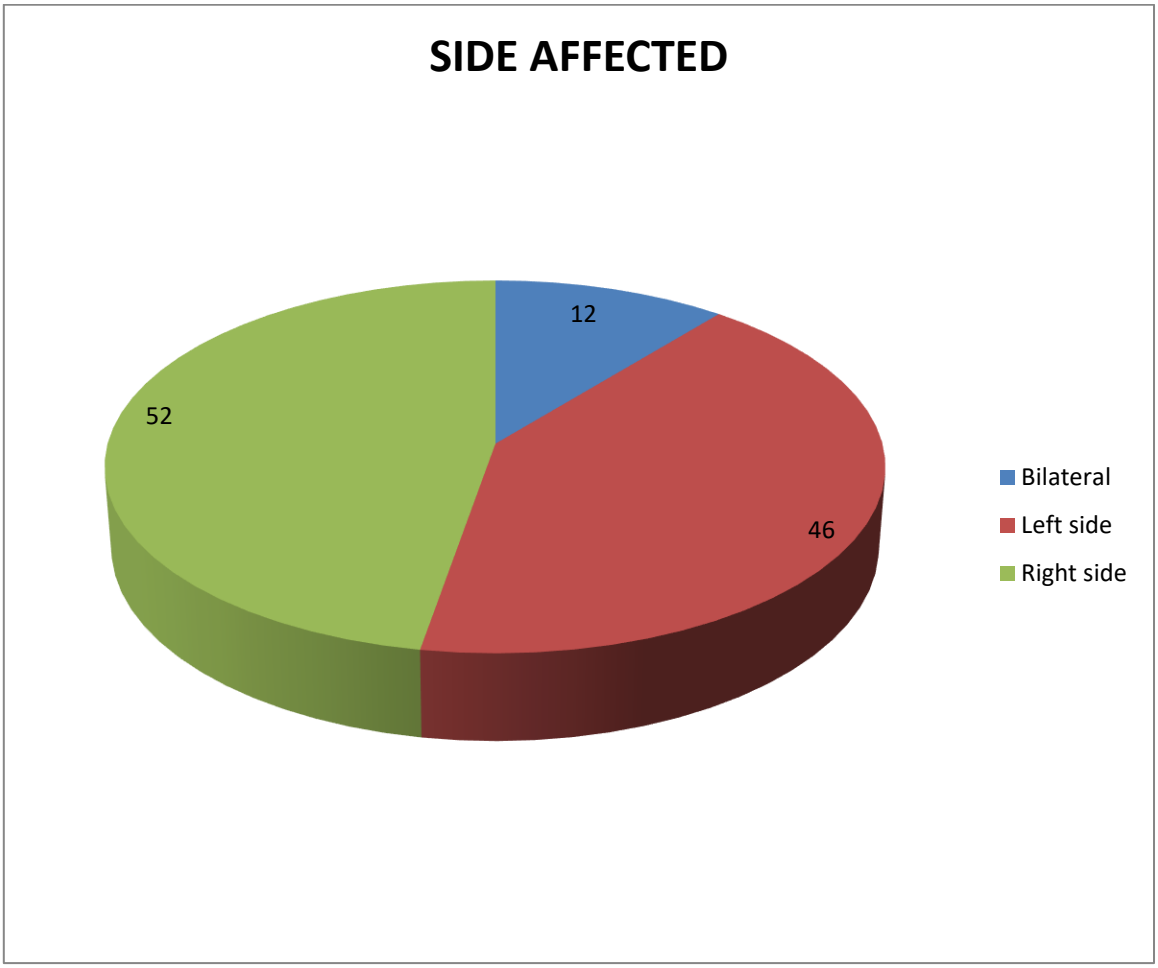


GRAPH 2: GENDER WISE DISTRIBUTION

TABLE 3: DISTRIBUTION OF UNILATERAL & BILATERAL CSOM

Side affected	Frequency	Percent
Bilateral	12	10.91%
Left side	46	41.82%
Right side	52	47.27%
Total	110	100%

Left side was found to be involved in 46 (41.82%), Right side was involved in 52 (47.27%) and bilateral involvement was reported in 12 (10.91%) cases.

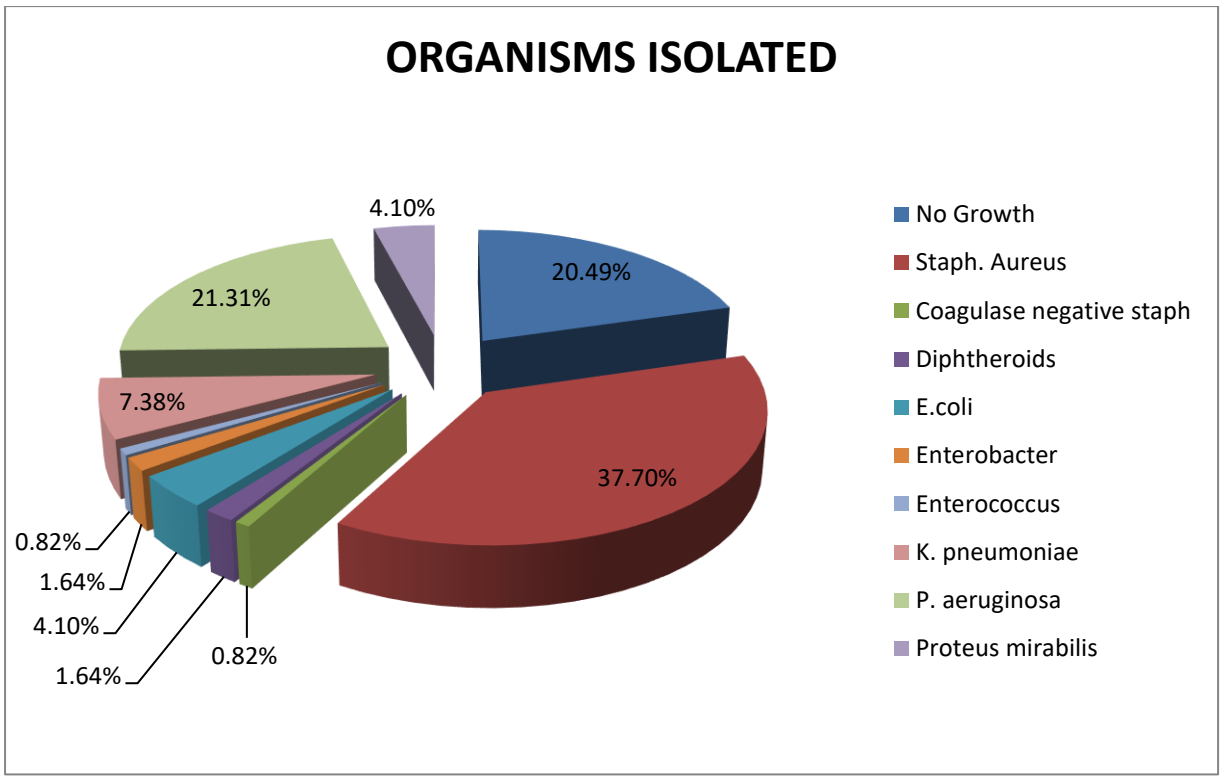


GRAPH 3: DISTRIBUTION OF UNILATERAL & BILATERAL CSOM

TABLE 4: MICROBIAL PROFILE

Organism isolated	Frequency	Percent
No Growth	25	20.49%
Staph. Aureus	46	37.70%
Coagulase negative staph	1	0.82%
Diphtheroids	2	1.64%
E.coli	5	4.10%
Enterobacter spp.	2	1.64%
Enterococcus spp.	1	0.82%
K. pneumonia	9	7.38%
P. aeruginosa	26	21.31%
Proteus mirabilis	5	4.10%
Total	122	100%

Staph. Aureus was isolated in 46 (37.70%), Coagulase negative staph in 1 (0.82%), Diphtheroids in 2 (1.64%), E-coli in 5 (4.10%), Enterobacter in 2 (1.64%), Enterococcus in 1 (0.82%), K. pneumonia in 9 (7.38%), P. aeruginosa in 26 (21.31%) and Proteus in 5 (4.10%)

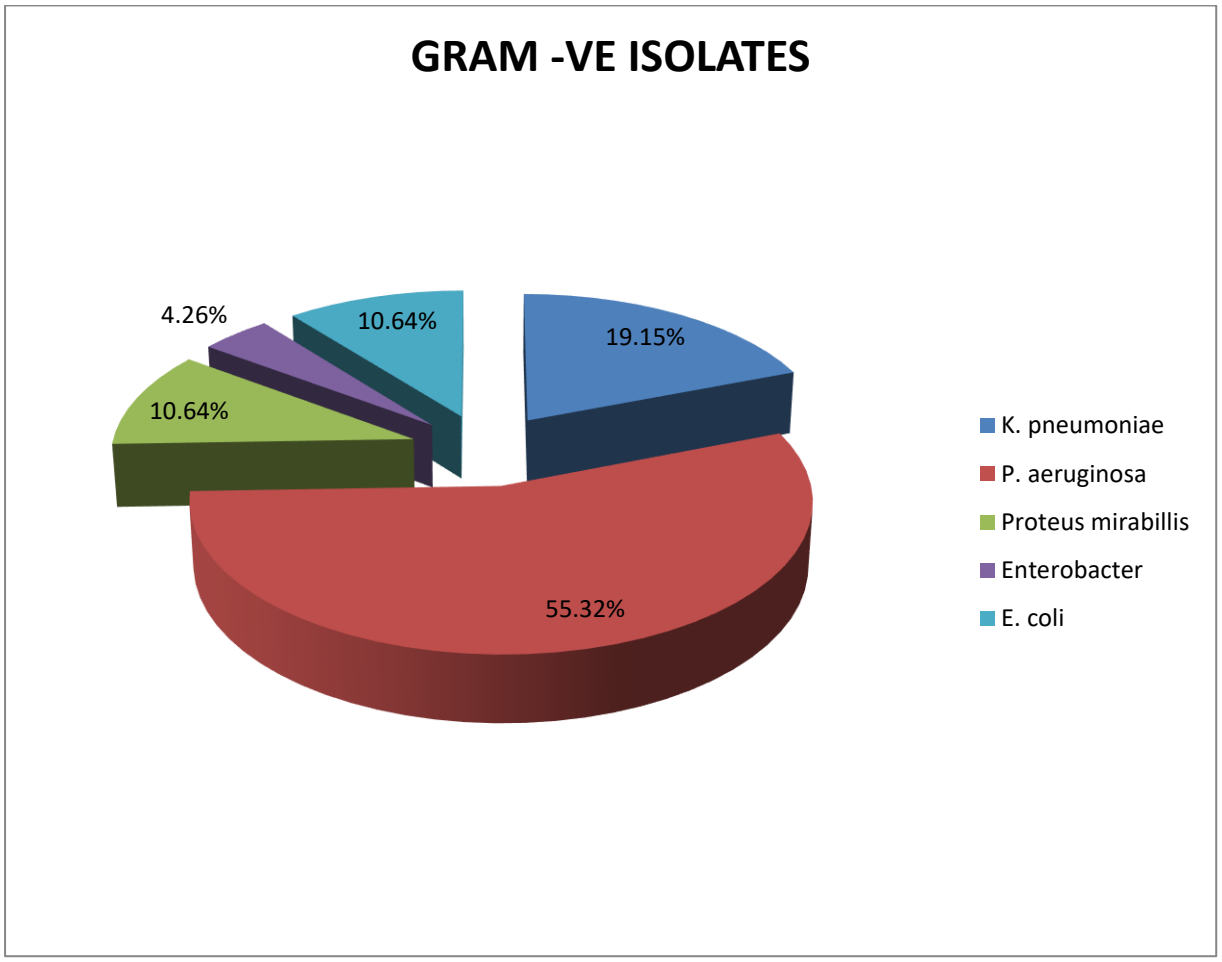


GRAPH 4: MICROBIAL PROFILE

TABLE 5: GRAM NEGATIVE ISOLATES

Gram -ve isolates	Frequency	Percent
K. pneumoniae	9	19.15%
P. aeruginosa	26	55.32%
Proteus mirabillis	5	10.64%
Enterobacter spp.	2	4.26%
E. coli	5	10.64%

The gram-negative organisms isolated were K. pneumoniae in 9 (19.15%), P. aeruginosa in 26 (55.32%), Proteus mirabilis in 5 (10.64%), Enterobacter in 2 (4.26%) and E. coli in 5 (10.64%) cases.

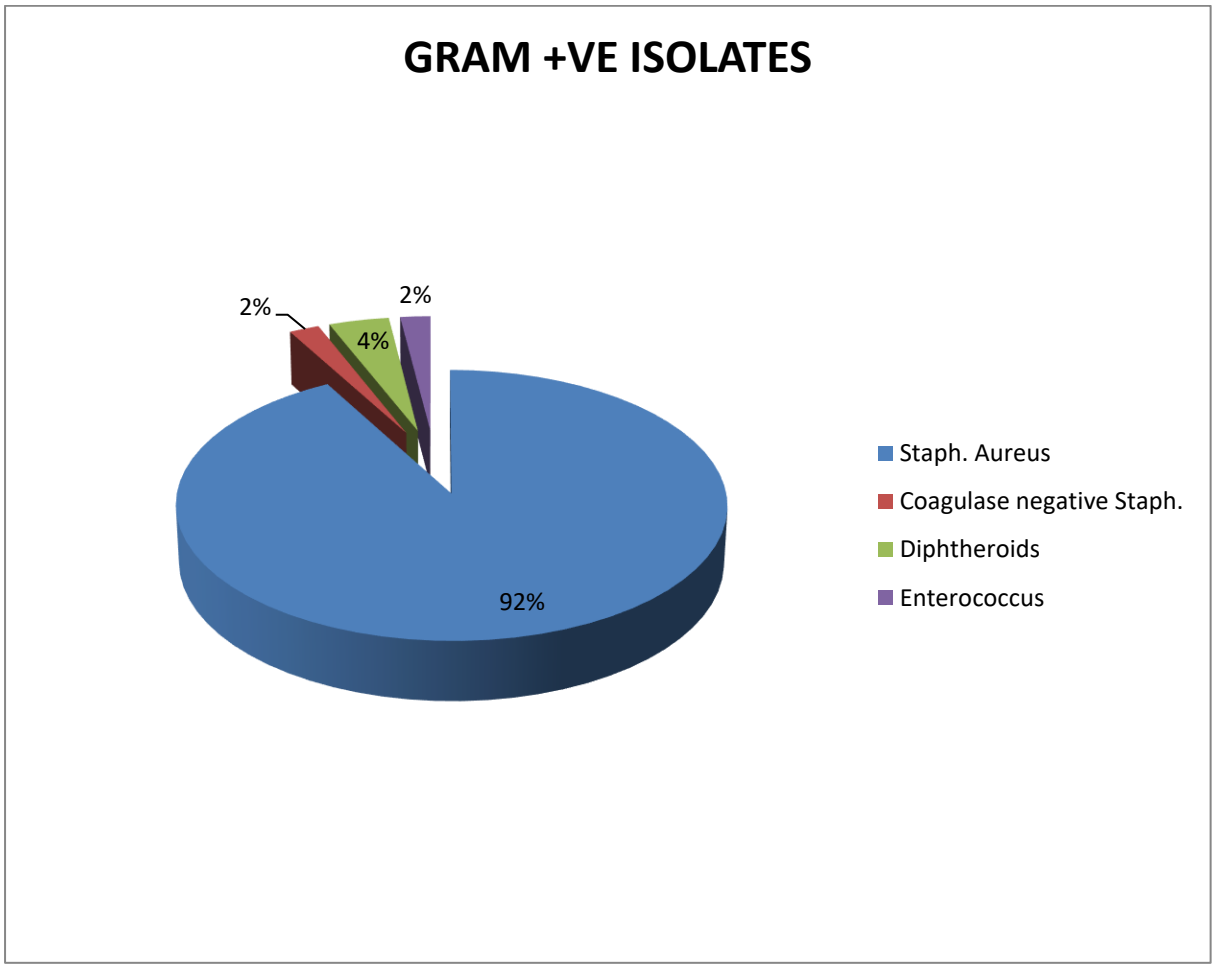


GRAPH 5: GRAM NEGATIVE ISOLATES

ABLE 6: GRAM POSITIVE ISOLATES

Gram +ve isolates	Frequency	Percent
Staph. Aureus	46	92%
Coagulase negative Staph.	1	2%
Diphtheroids	2	4%
Enterococcus spp.	1	2%

The gram positive organisms isolated were Staph. Aureus in 46 (92%), Coagulase negative staphylococcus in 1 (2%), Diphtheroids in 2 (4%) and Enterococcus in 1 (2%) cases.

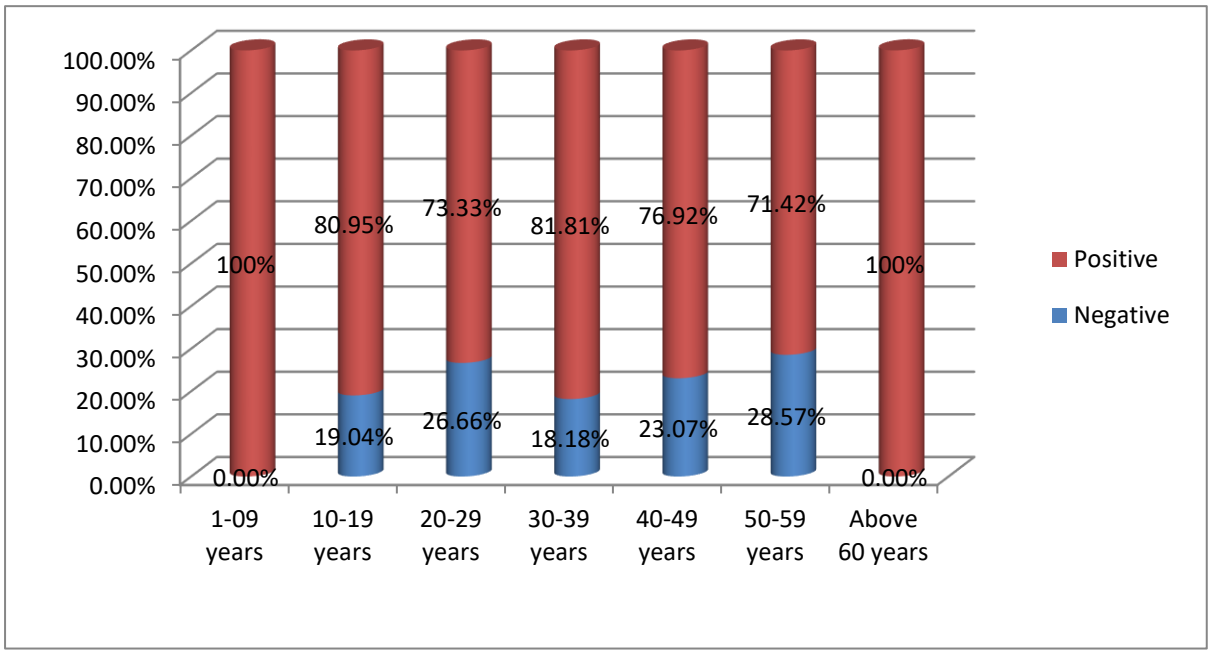


GRAPH 6: GRAM POSITIVE ISOLATES

TABLE 7: AGEWISE DISTRIBUTION OF CULTURE POSITIVE AND NEGATIVE

	Culture		Total
Age group	Negative	Positive	
1-09 years	0	7	7
	0.00%	100%	100%
10-19 years	4	17	21
	19.04%	80.95%	100%
20-29 years	12	33	45
	26.66%	73.33%	100%
30-39 years	4	18	22
	18.18%	81.81%	100%
40-49 years	3	10	13
	23.07%	76.92%	100%
50-59 years	2	5	7
	28.57%	71.42%	100%
Above 60 years	0	7	7
	0.00%	100%	100%
Total	25	97	122
	20.49%	79.50%	100%

The distribution of culture report was compared between different age groups and there was no significant difference in the culture report between different age groups.

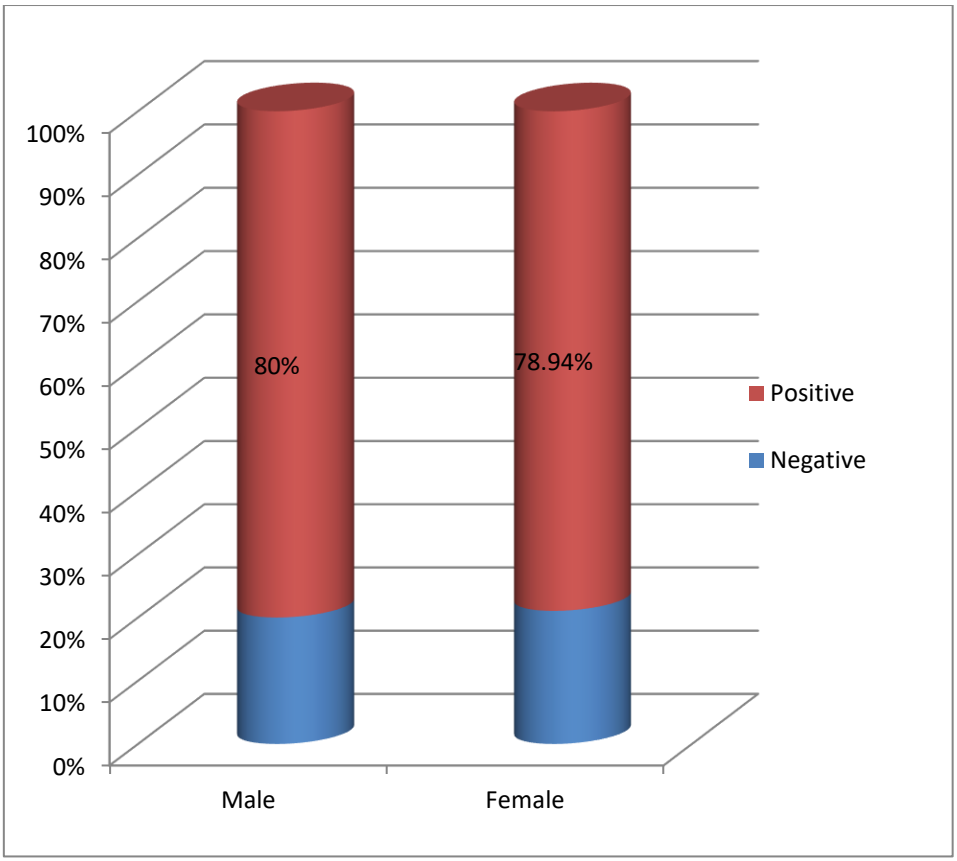


GRAPH 7: GRAPH SHOWING AGE WISE DISTRIBUTION OF CULTURE POSITIVE AND NEGATIVES

TABLE 8: GENDER WISE DISTRIBUTION OF CULTURE OSITIVES AND NEGATIVES

	Culture		Total
Gender	Negative	Positive	
Male	13	52	65
	20%	80%	100.00%
Female	12	45	57
	21.05%	78.94%	100.00%
Total	25	97	122
	20.49%	79.51%	100.00%

The distribution of culture report was compared between males and females and there was no significance difference in the culture report between males and females.



GRAPH 8: GENDER WISE DISTRIBUTION OF CULTURE POSITIVES AND NEGATIVES

TABLE 9: ANTIBIOTIC SUSCEPTIBILITY

	Ciprofloxacin	Gentamycin	Erythromycin	Cefepime	Levofloxacin	Cefotaxime	Amoxicillin	Cefuroxime	Vancomycin
Coagulase -ve staph.	0	1	0	NT	NT	NT	NT	NT	NT
Diphtheroids	NT	NT	NT	NT	NT	NT	NT	NT	NT
E.coli	0	0	0	0	1	0	0	0	NT
Enterobacter	NT	1	NT	1	1	1	0	1	NT
Enterococcus	1	1	1	NT	1	NT	0	NT	1
K.pneumoniae	1	8	6	3	4	6	0	2	NT
P. aeruginosa	10	9	4	2	5	1	1	5	NT
Proteus mirabilis	0	2	1	4	4	1	0	0	NT
Staph. Aureus	15	35	22	0	20	NT	0	4	42

TABLE 10: ANTIBIOTIC SUSCEPTIBILITY AND RESISTANCE PATTERNS FOR E. COLI

E.coli	Sensitive		Resistant	
Ciprofloxacin	0	0.0%	3	100.00%
Gentamycin	0	0.0%	1	100.00%
Erythromycin	0	0.0%	3	100.00%
Cefepime	0	0.0%	1	100.00%
Levofloxacin	1	33.30%	2	66.70%
Cefotaxime	0	0.0%	3	100.00%
Amoxicillin	0	0.0%	2	100.00%
Cefuroxime	0	0.0%	2	100.00%
Vancomycin	0	0.0%	0	0.00%

E. coli was found to sensitive to Levofloxacin in 33.3% cases.

TABLE 11: ANTIBIOTIC SENSITIVITY AND RESISTANCE PATTERNS FOR STAPH. AUREUS

Staph. Aureus	Sensitive		Resistant	
Ciprofloxacin	15	37.50%	25	62.50%
Gentamycin	35	89.74%	4	10.25%
Erythromycin	22	56.41%	17	43.58%
Cefepime	0	0.00%	6	100.00%
Levofloxacin	20	64.51%	11	35.49%
Cefotaxime	NT		NT	
Amoxicillin	0	0.00%	25	100.00%
Cefuroxime	4	80.00%	1	100.00%
Vancomycin	42	100.00%	0	0.00%

Staph. Aureus was found to be sensitive to Ciprofloxacin in 37.50%, Gentamycin in 89.74%, Erythromycin in 56.41%, Cefepime in 0.0%, Levofloxacin in 64.51%, Cefuroxime in 80%, Amoxicillin 0.0%, Cefuroxime in 80.0% and Vancomycin in 100.0%.

TABLE 12: ANTIBIOTIC SENSITIVITY AND RESISTANCE OF PSEUDOMONAS AERUGINOSA

P. aeruginosa	Sensitive		Resistant	
Ciprofloxacin	10	52.60%	9	47.40%
Gentamycin	9	56.30%	7	43.80%
Erythromycin	4	57.10%	3	42.90%
Cefepime	2	50.00%	2	50.00%
Levofloxacin	5	31.30%	11	68.80%
Cefotaxime	1	33.30%	2	66.70%
Amoxicillin	1	12.50%	7	87.50%
Cefuroxime	5	100%	0	0.00%
Vancomycin	NT		NT	

P. aeruginosa was found to be sensitive to Ciprofloxacin in 52.6%, Gentamycin in 56.30%, Erythromycin in 57.1%, Cefepime in 50.0%, Levofloxacin 31.30%, Cefotaxime in 33.3%, Amoxicillin in 12.50% and Cefuroxime in 100%.

TABLE 13: ANTIBIOTIC SENSITIVITY AND RESISTANCE PATTERNS FOR K. PNEUMONIAE

K.pneumoniae	**Sensitive**		**Resistant**	
Ciprofloxacin	1	20.00%	4	80.00%
Gentamycin	8	100%	0	0.00%
Erythromycin	6	75%	2	25%
Cefepime	3	75%	1	25%
Levofloxacin	4	57.14%	3	42.85%
Cefotaxime	6	75%	2	25%
Amoxicillin	0	0.00%	1	100%
Cefuroxime	2	100%	0	0.00%
Vancomycin	NT		NT	

K. pneumoniae was found to be sensitive to Ciprofloxacin in 20.0%, Gentamycin in 100.0%, Erythromycin in 75%, Cefepime in 75.0%, Levofloxacin in 57.14%, Cefotaxime in 75.0%, Amoxicillin in 0.0% and Cefuroxime in 100.0% cases.

DISCUSSION

Chronic Suppurative Otitis Media (CSOM) is considered as a major public health problem, in the developing world and India is one of the countries with high prevalence where urgent attention is needed.[51]

It is a persistent disease with risk of complications and is an important cause of preventable hearing loss in adults and children.[52]

Since chronic suppurative otitis media can cause significant morbidity, early microbiological diagnosis is required for effective treatment. Therefore, knowledge of pathogens and their antibiotic susceptibility pattern would guide the treating physicians in selecting appropriate antibiotics which would reduce the incidence of complications and emergence of resistance.[53]

This prospective study which was conducted at Santosh Hospital, Ghaziabad, included 110 patients with clinical diagnosis of CSOM. In the present study 122 samples were taken out of 110 patients. Among 122 samples 97 were culture positive for aerobic bacteria.

Out of the total, 12 patients had bilateral ear disease. Analysis of Age distribution showed peak incidence of CSOM in the third decade of life. Prakash et al in their study has reported peak incidence in the first decade of life.[54] Also Gadekar D et al.[55] observed in their study that most common age group affected was in first decade of life whereas Shylama and Reddy found second decade of life to be the most affected group.[56]

In a study conducted by Mahajan RK et al, most common age group affected was found to be third decade of life i.e. 21-30 years (32.7%). This study correlates with the present study.[57]

In the present study males are found to be affected more than females. In a study conducted by Haider A on 654 patients, male predominance was seen (72.3%) and female (27.7%).[58] Vareshney S studied 150 patients and found male (57.3%) more commonly affected than female (42.7%).[59] It correlates with the present study.

In the present study all the patients had tubo-tympanic type of CSOM. Sharma et al in their study has documented 72% of the cases as the safe or tubotympanic type and 28% as atticoantral type.[60]

In the present study 89.09% of patients had unilateral disease as compared to 10.91% having bilateral disease. Prakash Adhikari studied in 2009 and concluded unilateral ear disease in

69.9% of cases and bilateral CSOM in 31.1% patients.[61] OV Akinpelu et al in their study reported unilateral CSOM in 67% cases.[62] Adoga et al took 80 patients in their study and reported 74% unilateral and 6% in bilateral.[63] These findings are consistent with present study.

In the present study 20.49% patients were found to be culture negative i.e., no growth seen. Negative cultures can be due to non-bacterial growth or prior antibiotic therapy. Our hospital is a tertiary centre. Patients come to us after they have taken treatment from a local doctor, self-administration of medicine. In few cases patient might have concealed prior treatment history leading to no growth of micro-organism on culture media. This study correlates with study conducted by Rathi S. et al where unilateral disease was found in 59.16% cases.

Organisms isolated

Analysis of bacterial profile of the present study showed that Gram positive bacteria outnumbered Gram negative bacteria which are similar to studies by Prakash M et al.[64] A total of 9 bacterial species were identified in our study i.e. Staphylococcus aureus (37.70%), Pseudomonas aeruginosa (21.31%), Klebsiella pneumoniae (7.38%), Proteus mirabilis and E coli (4.10%) respectively, Coagulase negative staphylococcus aureus (0.82%), Enterococcus (0.82%), Enterobacter (1.64%) and Diphtheroid (1.64%). Prakash M et al have found that Pseudomonas aeruginosa (37.5%) and Staphylococcus species (41.25%) are the commonest organism isolated from otitis media. In contrast, Dhillon V et al in their study has documented Staphylococcus aureus to be the predominant isolate comprising of 22.5% of the total followed by E coli (21.25%).[65]

In a study conducted by Deb T at Agartala on 97 patients out which 53 were culture positive cases of aerobic bacteria. It was observed that Pseudomonas 20 (37.73%) were the commonest bacteria isolated followed by Escherichia coli 11 (20.75%) and Staphylococcus aureus 11 (20.75%) and Proteus 9 (16.98%) and Klebsiella 2 (3.77%). It is observed that 42 out of the 53 bacterial isolates, approximately 75%, were of gram-negative type in CSOM.[66] In another study conducted by Hiremath B et al on 120 patients, 116 were culture positive. The bacteriological profile in this study showed that the most common aerobic organism isolated was Pseudomonas aeruginosa (38.79%) and the most common anaerobic organism isolated was Prevotella intermedia (4.3%). Also, out of 116 isolates identified, 60.49% cases were of gram-negative organisms and 39.51% cases were of gram-positive organisms.[67]

Prakash et al in their study reported Coliforms including Klebsiella pneumoniae and Escherichia coli in 9.42% and 7.33% cases respectively and these findings were tandem to the study done by Mansoor et al.[68] who reported K. Pneumoniae in 8% and E. coli in 4% whereas Poorey and Iyer[69] in their study has reported a high incidence of Klebsiella (25.4%). The frequency of Staphylococcus aureus in the middle ear infection can be attributed to its ubiquitous nature and high carriage rate of resistant strains in external ear. Organisms like Proteus spp. Also secondarily invade middle ear through external auditory canal via a tympanic membrane perforation. Organisms like E. coli and Klebsiella spp. become opportunistic infections in middle ear when resistance is low.

These studies depict that the microbial profile change in different regions, based on patient population and geographical distribution and hence requires the need for frequent analysis and update of the microbial profile in every region.

Antimicrobial sensitivity pattern of isolates

In the present study, antibiotic susceptibility testing was done for all the isolated organisms by using Muelller Hinton media. Antibiotic susceptibility pattern of P. aeruginosa revealed sensitive to Ciprofloxacin in (52.60%), Gentamycin in (56.30%), Erythromycin in (57.10%), Cefipime in (50.00%), Levofloxacin in (31.30%), Cefotaxime in (33.30%), Amoxicillin in (12.50%) and Cefuroxime in (100.0%). The sensitivity pattern of Pseudomonas aeruginosa was similar to the studies done by Maringanti D et al.[70] in which the authors have concluded sensitivity to Ciprofloxacin and Gentamycin. Both Ciprofloxacin and Gentamycin are commonly used first line drugs for oral use as well as topical ear drops. Research done at G. M. Hospital, P. aeruginosa strains were susceptible to ceftazidime (100%), ciprofloxacin (92%) and amikacin and gentamycin (85%).[71]

Mansoor T et al in their study showed that amikacin was active against 96% of the isolates of Pseudomonas, followed by ceftazidime (89%)69. In the study conducted by Rajkumari A et al Pseudomonas aeruginosa was found sensitive to Levofloxacin (63.63%) and resistant to drugs like Gentamycin (72%), Amoxicillin/Clavulanic acid (63.63%). Staphylococcus aureus was sensitive to Vancomycin (100%) and resistant to Erythromycin (66.66%). Other gram-negative bacteria (other than pseudomonas) were sensitive to ceftazidime (83.33%), Levofloxacin

(83.33%) and resistant to drug such as Ampicillin (66.66%), Tetracycline (50%), Gentamycin (50%).[72]

Aminoglycosides are bactericidal antibiotics that interfere with protein synthesis and are frequently used because of its activity against gram-negative bacteria. In the present study majority of the Pseudomonas aeruginosa isolates were found to be more sensitive to gentamicin.

In the present study 52.60% of P. aeruginosa was found to be sensitive to ciprofloxacin which is similar to various studies that has reported 90% sensitivity to ciprofloxacin.[73]

The most commonly isolated organism was Staphylococcus aureus (37.70%) and was found to be sensitive to Ciprofloxacin in 37.50%, Gentamycin in 89.74%, Erythromycin in 56.41%, Levofloxacin in 64.51%, Cefuroxime in 80.00% and Vancomycin in 100.0% cases. Some studies have shown higher sensitivity patter of fluoroquinolones.

A. Srivastav et al showed 100% sensitivity to fluoroquinolones and 97% sensitive to cephalosporins. Other isolates in the study showed sensitivity to aminoglycosides, fluoroquinolones and cephalosporins.[74] Our study correlates with the above mentioned study.

CONCLUSION

The aerobic bacteriological study of CSOM showed Staphylococcus aureus as the most common infective organism followed by Pseudomonas aeruginosa, Klebsiella pneumoniae, E. coli, Proteus mirabilis, Enterococcus, Enterobacter.

The antibiotic susceptibility showed maximum sensitivity to fluoroquinolones, gentamicin.

Use of carefully selected topical or systemic antibiotics, culture and sensitivity report and adequate ear toilet is an effective treatment modality. This will prevent emergence of drug resistance.

SUMMARY

A total of 110 cases of diagnosed COM from Santosh Hospital were included in the study.

There was a male predominance among the cases. (53.64%)

Analysis of age distribution showed most commonly affected age group found to be affected was the third decade of life.

Analysis of culture results showed culture positive in 97 patients and no growth was observed in 25 patients.

In the present study out of 110 patients, 98 had unilateral COM and 12 had bilateral COM.

Analysis of bacterial flora showed predominance of Staphylococcus aureus (37.70%) followed by Pseudomonas aeruginosa (21.31%)

The other Gram-negative isolates isolated were Klebsiella pneumonia (7.38%), E. coli (4.10%), P. mirabilis (4.10%), Enterobacter (1.64%)

The Gram-Positive organisms isolated include Staphylococcus aureus (37.70%), Enterococcus (0.82%) and coagulase negative staphylococcus (0.82%).

In the present study for all the isolates Fluoroquinolones was found to be the most effective drug followed by gentamicin and cefuroxime.

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PROFORMA

- **Case No:**
- **Name of the Patient:**
- **Age:**
- **Sex: Male/Female**
- **Occupation:**
- **Socio Economical Status: low/ middle/ high**
- **Address:**
- **Chief Complaints:**
- **History Of Presenting Illness:**
- **Past History:**
- **Family History:**
- **Personal History:**
- **General Physical Examination:**
- **Systemic Examination: CVS/ CNS/ Resp./ ABD**

• **Examination of the Ear** • **Auricle** • **Preauricular Area** • **Postauricular Area** • **Mastoid Area** • **EAC** • **TM**	**Right**	**Left**

- **Tragal Sign:**
- **Fistula Sign:**
- **Tunning Fork Test: Right Left**
- **Rinne's:**
- **Weber's:**
- **Facial Nerve Examination:**
- **Examination Of nose and PNS:**
- **Ext**
- **Nasal Cavity Right Left**
- **Examination of Oral Cavity:**
- **Lips**
- **Toungue**
- **Oral Cavity**
- **Oropharynx**
- **Posterior Pharyngeal Wall**
- **Examination of Neck:**
- **Any Swelling**
- **Lymph Nodes**
- **Diagnosis: Signature of Doctor:**
- **Procedure Explained to Patient : Yes/ No Date:**
- **Consent Taken: Yes/No Time:**
- **Follow Up: Place:**

DEPARTMENT OF ENT

SANTOSH MEDICAL COLLEGE & HOSPITAL

GHAZIABAD, U.P

You are being requested to take part in a study entitled

OBSERVATION ON THE CURRENT BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY OF CHRONIC SUPPURATIVE OTITIS MEDIA

VOLUNTARY PARTICIPATION

Your participation in the study is entirely voluntary and you are free to with draw from the study as and when you feel so.

CONSENT FORM

I, _____ Son/ Daughter/ Wife of _____ Resident of _____ Hereby declare that I give my full, free and voluntary informed consent in the thesis

OBSERVATION ON THE CURRENT BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY OF CHRONIC SUPPURATIVE OTITIS MEDIA

Dr. DIRGH SHAH has informed me to my full satisfaction, in the language I understand, about the purpose, nature of study and various laboratory investigations for the study to be carried out. I have been informed about the duration of the study and instructions to be followed during the study period.

I give full consent for being enrolled in the above study and I reserve my rights to withdraw from this study, whenever I wish without prejudice of my right to undergo further treatment at Santosh Hospital, Ghaziabad U.P.

Patient/ Patient's relative signature — Doctor signature

Or thumb impression

Name: — Date:

We have witnessed that the patient signed the above form in the presence of his free will after fully understanding its content.

1. Signature of Witness	2. Signature of Investigator
Name:	Name:

Dr. DIRGH SHAH
Post Graduate Student
Batch: 2020-2023
Department of ENT
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Ghaziabad – 201001 (U.P.)

संतोष मेडिकल कॉलेज एवं अस्पताल (गाजियाबाद)

<u>सूचितसहमति</u>

मैं _____ बेटा_____

निवासी_____ घोषणा करता हूं कि मैं डॉ._____, ने मुझे मेरी भाषा में अपने अध्ययन, अध्ययन के उद्देश्य के बारे मे, और अध्ययन के दौरान अपना ईजानेवाली विभिन्न प्रयोगशाला जांच के बारे में सूचित कर दिया है। मुझे अध्ययन की अवधि और उसके दौरान अपना एजाने वाले निर्देश भी मेरी भाषा मे समझा दिए गए हैं| मैं उपरोक्त अध्ययन में बिना किसी दबाव के दाखिला ले रहा हूं और पूर्ण सहमति दे रहा हूं| सन्तोष अस्पताल, गाजियाबाद में अपने आगेके उपचार पर बिना प्रतिकूल प्रभाव डाले इस अध्ययन से और प्रयोगशाला जांच कीप्रकृति से मैं जब चाहूँ बाहर जाने के अपने अधिकार को सुरक्षित रख रहा हूं

रोगी / रोगी के रिश्तेदार के हस्ताक्षर **डॉक्टर के हस्ताक्षर या अंगूठे का निशान**

नाम: **दिनांक:**

मेरी उपस्थिति में मरीज ने पूरी तरह से डाकटर के बताए गए अध्ययन और निर्देशों को समझने के बाद अपनी स्वतंत्र इच्छा से ऊपरके फार्म पर हस्ताक्षर कि ए हैं।

Signature of Investigator

DR. DIRGH SHAH

Post Graduate Student

Department of ENT

Session: 2020-2023

MASTERCHART

Sr. No.	IP No.	NAME	AGE	SEX	SIDE OF EAR - R/L	ISOLATED ORGANISM	TYPE OF COM	ANTIBIOTIC SUSCEPTIBILITY								
								GENT	CIPRO	LEVO	ERYTH	AMOX	CEFEP	CEFOT	CEFU	VANCO
1	17123420	MANOJ	10	M	R/E	Staph.aureus	TTD	S	S	–	S	–	R	–	–	S
2	17113293	SHUBHAM	22	M	L/E	Staph.aureus	TTD	S	R	S	S	–	R	–	S	S
3	17108579	ARCHANA	8	F	L/E	Staph.aureus	TTD	S	S	R	S	–	–	–	–	S
4	17123427	LALCHAND	65	M	R/E	P.aeruginosa	TTD	S	S	S	R	S	S	–	–	–
5	17122067	SHIVANI	25	F	R/E	E.coli	TTD	–	R	–	–	–	–	R	–	–
6	17090547	VIMLA	52	F	L/E	Staph.aureus	TTD	S	S	–	S	–	–	–	–	S
7	17090350	GOVIND	50	M	R/E	Staph.aureus	TTD	S	S	R	R	–	–	–	–	S
8	17103595	ASHOK	36	M	L/E	P.aeruginosa	TTD	–	S	R	S	–	–	–	–	–
9	17085792	RAZIYA	16	F	L/E	K.pneumoniae	TTD	S	–	S	–	–	S	R	–	–
10	17098952	NISHA	26	F	R/E	Enterococcus	TTD	S	S	S	S	R	–	–	–	S
11	17112513	T.C. JAIN	68	M	L/E	P.aeruginosa	TTD	–	S	S	–	R	–	R	–	–
12	17123422	DIVYA	47	F	R/E	Staph.aureus	TTD	S	R	–	S	–	R	–	–	S
13	17098816	AKASH	20	M	R/E	E.coli	TTD	–	–	S	–	R	R	R	R	–
14	17099636	SATVIKI	7	F	L/E	K.pneumoniae	TTD	S	–	R	R	–	S	S	–	–
15	17086679	KAVITA	42	F	R/E	P.aeruginosa	TTD	S	S	R	–	–	–	R	S	–
16	17087983	DEEPAK	23	M	L/E	Staph.aureus	TTD	S	R	–	–	R	–	–	–	S
17	17112541	ASHIKA	12	F	L/E	No Growth	TTD									
18	17092670	GAURAV	23	M	R/E	Staph.aureus	TTD	–	S	R	S	R	–	–	R	–
19	17098007	DAYAVATI	55	F	R/E	No Growth	TTD									
20	17112387	SUNNY	48	M	L/E	Staph.aureus	TTD	S	R	S	R	R	–	–	S	S
21	1702925	VARHSA	24	F	R/E	P.aeruginosa	TTD	S	–	R	S	–	–	S	R	
22	1789092	DEVANSH	5	M	R/E	Staph.aureus	TTD	S	R	–	S	–	–	–	–	S
23	17090527	REKHA	35	F	R/E	Enterobacter	TTD	S	–	–	–	–	S	–	S	–
24	17101493	ABHISHEK	28	M	R/E	K.pneumoniae	TTD	S	S	S	R	R	S	S	–	–
25	17107703	MUNSHI	33	M	B/E - R	P.aeruginosa	TTD	S	–	–	–	–	–	–	–	–
					B/E - L	No Growth	TTD									
26	17101824	POONAM	52	F	L/E	Staph.aureus	TTD	S	–	–	–	R	–	–	–	S
27	17091443	RUDRA	7	M	R/E	Staph.aureus	TTD	S	R	S	S	–	R	–	–	S
28	17131911	SHIVANI	36	F	R/E	P.aeruginosa	TTD	–	S	–	–	–	–	–	R	S
29	17118929	RAVI	24	M	R/E	No Growth	TTD									
30	17086998	PRIYA	11	F	L/E	Proteus mirabilis	TTD	–	R	–	–	R	S	–	–	–
31	17100654	ANAS	24	M	L/E	P.aeruginosa	TTD	S	S	R	–	–	R	–	R	–
32	17131502	PRINCY	39	F	R/E	E.coli	TTD	–	R	R	R	–	–	R	–	–
33	17087034	SURAJPAL	44	M	B/E - R	No Growth	TTD									
					B/E - L	Staph.aureus	TTD	S	S	–	S	–	–	–	–	S
34	17129492	SATYPAL	24	M	L/E	P.aeruginosa	TTD	S	–	–	–	–	–	–	R	–
35	17114689	SHARDA	15	F	R/E	Staph.aureus	TTD	S	R	R	S	R	–	–	–	S
36	17110628	AFZAL	25	M	L/E	P.aeruginosa	TTD	S	–	–	–	–	–	–	–	–
37	17103336	VYAS	50	M	B/E - R	Staph.aureus	TTD	S	R	S	R	R	–	–	S	S
					B/E - L	No Growth	TTD									
38	17080767	VIJAYKANT	67	M	L/E	Staph.aureus	TTD	S	R	–	S	R	–	–	–	S

39	17111412	ANITA	47	F	R/E	P.aeruginosa	TTD	–	S	–	S	–	–	–	R	–
40	17115906	SHRINIVAS	59	M	L/E	No Growth	TTD									
41	17114385	PRIYA	28	F	R/E	Staph.aureus	TTD	–	R	S	R	–	–	–	–	–
42	1708997	SONI	22	F	R/E	Proteus mirabilis	TTD	S	–	S	–	–	S	–	–	–
43	17103676	JAYANT	15	M	R/E	K.pneumoniae	TTD	S	R	R	S	–	R	S	–	–
44	17098988	VIJAY	30	M	R/E	P.aeruginosa	TTD	S	–	R	S	R	–	–	–	S
45	17104791	RUKHSANA	25	F	B/E - R	Staph.aureus	TTD	S	R	–	S	R	–	–	–	S
					B/E - L	No Growth	TTD									
46	17114848	SATBEER	60	M	L/E	Staph.aureus	TTD	S	R	S	S	–	–	–	–	S
47	17121115	VIKAS	27	M	L/E	No Growth	TTD									
48	17089472	SITARAM	28	M	L/E	Staph.aureus	TTD	S	R	S	R	R	–	–	–	S
49	17101409	RASHI	15	F	R/E	K.pneumoniae	TTD	S	R	S	S	–	–	R	–	–
50	17099610	ASHUTOSH	24	M	R/E	P.aeruginosa	TTD	–	S	R	–	–	–	–	R	–
51	17098138	MUSTAFA	25	M	R/E	Enterobacter	TTD	–	–	S	–	–	–	S	–	–
52	17104728	RAJNI	35	F	R/E	Staph.aureus	TTD	S	R	–	S	–	–	–	–	S
53	17112389	JYOTI	9	F	L/E	No Growth	TTD									
54	17088021	RAJEEV	45	M	L/E	P.aeruginosa	TTD	S	–	–	–	–	–	–	–	–
55	17097866	PINKY	24	F	B/E - R	Staph.aureus	TTD	S	R	R	S	R	–	–	–	S
					B/E - L	No Growth	TTD									
56	17129501	RUBY	11	F	L/E	P.aeruginosa	TTD	R	R	–	–	–	–	–	–	S
57	17116354	SUNIL	36	M	R/E	K.pneumoniae	TTD	S	R	R	S	–	–	S	–	–
58	17103678	AJAY	45	M	B/E - R	Staph.aureus	TTD	S	S	–	R	R		–		S
					B/E - L	No Growth	TTD									
59	17116413	NAINA	12	F	R/E	Staph.aureus	TTD	S	R	S	–	–	R	–	–	S
60	17101502	SONIYA	42	F	L/E	P.aeruginosa	TTD	–	R	–	R	–	–	–	–	–
61	17114828	VISHAL	28	M	R/E	Diphtheroids	TTD	–	–	–	–	–	–	–	–	–
62	17100579	EKTA	42	F	L/E	K.pneumoniae	TTD	S	R	S	S	–	–	S	S	
63	17104962	MAYANK	18	M	L/E	Staph.aureus	TTD	S	R	S	R	R	–	–	–	S
64	17101837	GOPAL	28	M	R/E	No Growth	TTD									
65	17114410	SAVITRI	32	F	L/E	Staph.aureus	TTD	S	R	–	R	R	–	–	–	S
66	17103136	SAPNA	24	F	R/E	P.aeruginosa	TTD	R	R	–	–	R	–	–	–	S
67	17104833	AMAN	15	M	L/E	Staph.aureus	TTD	R	S	S	R	R	–	–	–	–
68	17097492	AJIT	35	M	B/E - R	No Growth	TTD									
					B/E - L	Staph.aureus	TTD	S	R	R	R	R	–	–	–	S
69	17102954	SANJAY	40	M	L/E	P.aeruginosa	TTD	–	S	R	–	–	–	–	–	–
70	17086926	RICHA	24	F	R/E	Coag. neg staph	TTD	S	R	–	R	–	–	–	–	–
71	17090488	RAMSINGH	70	M	R/E	P.aeruginosa	TTD	–	R	–	R	–	–	–	–	S
72	17086301	KUSUM	28	F	B/E - R	Staph.aureus	TTD	S	R	S	S	–	–	–	–	S
					B/E - L	No Growth	TTD									
73	17114422	SHAHID	19	M	L/E	Proteus mirabilis	TTD	S	–	S	–	–	S	–	R	–
74	17123430	JIGYASA	24	F	R/E	Staph.aureus	TTD	S	S	–	R	R	–	–	–	S
75	17092671	MAHENDRA	36	M	R/E	P.aeruginosa	TTD	R	–	R	–	–	–	–	–	–
76	17114867	YUVIKA	3	F	L/E	P.aeruginosa	TTD	–	R	R	–	–	S	–	–	–
77	17102202	KARAN	27	M	B/E - R	Staph.aureus	TTD	S	R	S	S	–	–	–	–	S
					B/E - L	No Growth	TTD									

78	17129473	SANNA	44	F	L/E	Diphtheroids	TTD	–	–	–	–	–	–	–	–	–
79	17103169	NAVASH	24	M	L/E	P.aeruginosa	TTD	R	R	S	–	R	–	–	–	–
80	17119005	TARUN	15	M	R/E	P.aeruginosa	TTD	R	S	R	–	R	–	–	–	–
81	17096368	KAMARJHN	37	F	L/E	E.coli	TTD	R	R	–	R	R	–	–	R	–
82	17107151	NAVIN	23	M	L/E	Staph.aureus	TTD	S	R	R	S	–	–	–	–	S
83	17089904	MANISH	17	M	B/E - R	No Growth	TTD									
					B/E - L	Staph.aureus	TTD	R	–	S	R	–	–	–	–	–
84	17097686	SUMAN	39	F	R/E	Staph.aureus	TTD	–	R	S	R	R	–	–	–	S
85	17116352	VAIDIK	42	M	L/E	K.pneumoniae	TTD	S	–		S	–		S	S	–
86	17092639	UJWAL	14	M	R/E	Staph.aureus	TTD	S	–	R	–	R	R	–	–	S
87	17114842	SIDHARTH	29	M	L/E	Proteus mirabilis	TTD	–	–	S	–	–	S	–	–	–
88	17118260	MEENU	36	F	R/E	No Growth	TTD									
89	17112298	SURJEET	12	M	L/E	Staph.aureus	TTD	S	–	–	–	–	–	–	–	S
90	17107217	SAVITA	28	F	R/E	E.coli	TTD	–	–	R	R	–	–	–	–	–
91	17103094	ANJALI	16	F	R/E	P.aeruginosa	TTD	R	R	S		R	R	–	–	–
92	17097574	SARTAJ	26	M	L/E	Staph.aureus	TTD	S	S	–	S	R	–	–	–	S
93	17098127	AMIT	17	M	B/E - R	Staph.aureus	TTD	–	S	S	R	R	–	–	–	S
					B/E - L	No Growth	TTD									
94	17087150	NARAYAN	65	M	R/E	Staph.aureus	TTD	–	S	R	–	R	–	–	–	S
95	17098952	NISHA	26	F	L/E	K.pneumoniae	TTD	–	–	–	S	–	–	–	–	–
96	17092328	TARAVATI	52	F	R/E	Staph.aureus	TTD	S	–	S	S	–	–	–	–	S
97	17089705	PAYAL	24	F	L/E	No Growth	TTD									
98	17098849	ADARSH	19	M	R/E	Proteus mirabilis	TTD	–	–	S	S	–	–	S	–	–
99	17114388	NARENDRA	45	M	B/E - R	Staph.aureus	TTD	S	R	S	–	R	–	–	–	S
					B/E - L	No Growth	TTD									
100	17101440	RAJKUMAR	62	M	R/E	Staph.aureus	TTD	S	R	R	–	–	–	–	S	S
101	17089965	DOLLY	21	F	R/E	No Growth	TTD									
102	17097694	PUSHPA	36	F	L/E	Staph.aureus	TTD	–	S	S	R	R	–	–	–	S
103	17121228	KRIAHNA	14	M	R/E	P.aeruginosa	TTD	R	R	S	–	R	–	–	R	–
104	1799700	ARIFA	14	F	L/E	No Growth	TTD									
105	17099841	SALONI	22	F	L/E	Staph.aureus	TTD	–	S	S	R	R	–	–	–	S
106	17129487	ANURADHA	35	F	R/E	No Growth	TTD									
107	17088929	FARZAN	8	M	L/E	No Growth	TTD									
108	17110602	ALKA	27	F	L/E	Staph.aureus	TTD	R	–	S	R	R	–	–	–	S
109	17110569	ANISHKA	36	F	R/E	P.aeruginosa	TTD	–	R	R	–	–	–	–	–	
110	17117779	RAJA	24	M	R/E	Staph.aureus	TTD	R	S	R	S	–	–	–	–	S

KEY TO MASTERCHART

Sr. No. - Serial number

IP No. - OPD number

R/E - Right Ear

L/E - Left Ear

TTD - Tubotympanic Disease

S - Sensitive

R - Resistant

GENT - Gentamycin

CIPRO - Ciprofloxacin

LEVO - Levofloxacin

ERYTH - Erythromycin

AMOX - Amoxycillin

CEFEP - Cefepime

CEFOT - Cefotaxime

CEFU - Cefuroxime

VANCO - Vancomycin

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F. No. SU/2021/1830[66] Dated: 17.07.2021

Subject: Grant of Ethical Clearance for Thesis Protocol Topic **"OBSERVATIONS ON THE CURRENT BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY OF CHRONIC SUPPURATIVE OTITIS MEDIA.",** submitted by **Shah Dirgh Harshadbhai,** MD/MS student of Batch 2020-2021, Department of **ENT.**

*****

With reference to his/her request for grant of Ethical Clearance for the Thesis Protocol entitled **"OBSERVATIONS ON THE CURRENT BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY OF CHRONIC SUPPURATIVE OTITIS MEDIA.", Shah Dirgh Harshadbhai** is informed that the Thesis Protocol submitted by him/her was considered by the **Screening Committee** of the Santosh Medical College & Hospital in its meetings held on 19.03.2021, 22.03.2021, 24.03.2021, 25.03.2021, 26.03.2021, 27.03.2021 and 06.04.2021. The recommendations of the **Screening Committee** were considered in detail by the Institutional **Ethics Committee** in its meeting held on **12.07.2021** and the same was **approved** by the **Ethics Committee.**

He /She is informed accordingly for further necessary action.

[Dr. V. P. Gupta]
REGISTRAR

REGISTRAR
SANTOSH DEEMED TO BE UNIVERSITY
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6. Dr. Vandana Singh (Guide)
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Document Information

Analyzed document	Dr Dirgh Shah-2.docx (D149444243)
Submitted	11/12/2022 8:08:00 AM
Submitted by	Dr Jyoti Batra
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INTRODUCTION

Infections of middle ear cleft and their complications have affected humans from the beginning. Described by Hippocrates in 450 BC, this process continues to present one of the most commonly experienced medical problems in infancy and childhood. It is one of the leading causes of decreased hearing in young children (1). The worldwide prevalence of Chronic Suppurative Otitis Media (CSOM) is 65 to 330 million people and out of them 60% of people having clinically significant hearing impairment. (2) Chronic suppurative otitis media (CSOM) is defined as a as chronic inflammation of mucoperiosteal lining of middle ear and mastoid cavity, presenting with recurrent ear discharge through a tympanic membrane perforation.(3) Disease usually starts in infancy as spontaneous tympanic membrane perforation following an upper respratiory tract infection leading to infection of middle ear cavity spreading through the Eustachian tube. Generally, patients with eardrum perforations having continuous mucoid, mucopurulent, purulent discharge for the period more than 6 weeks, are categorized as chronic suppurative otitis media cases.(4) The episodes of otorrhea often follow upper respiratory infections, water entry into the ear during swimming or bathing leading to intermittent ear discharge. Risk factors implicated are recurrent sore throat, low socio-economic status, age, poor hygiene, immunocompromised status, environmental factors, nutritional factors and facial anomalies etc.(5) In CSOM bacteria implicated may be aerobic and anaerobic Gram-positive organisms included are Pseudomonas aeruginosa, Staphylococcus aureus, Haemophilus influenza; Gram negative organisms included are E. coli, Proteus mirabilis or anaerobic- Bacteroides', Pepto streptococcus. Bacteria are infrequently found in skin of external auditory canal, but may proliferate in the presence of trauma, laceration or high humidity. These bacteria gain entry to the middle ear through tympanic membrane perforation. It is broadly classified as: 1. SQUAMOSAL DISEASE /UNSAFE TYPE/ ATTICOANTRAL TYPE 2. MUCOSAL DISEASE /SAFE TYPE/ TUBOTYMPANIC TYPE